Leg ulcers

See also the separate Venous Leg Ulcers article.

What is a leg ulcer?

A leg ulcer is defined as the loss of skin below the knee on the leg or foot, which takes more than two weeks to heal.[1]

What causes leg ulcers? (Aetiology)

The aetiology of leg ulcers may be venous, arterial, neuropathic, pressure ulcers, or a combination of more than one factor. It is very important to determine the aetiology of the ulcers as this has crucial implications for management. However, it is not uncommon to have a venous ulcer in the presence of arterial insufficiency and this complicates matters.

How common are leg ulcers? (Epidemiology)

The UK prevalence of chronic venous ulceration is assessed as 0.15%-0.3%. Prevalence increases with age and with obesity.[2]

There is no difference in prevalence between socio-economic classes but, in people from lower social classes, they take longer to heal. About 80% are managed entirely in the community.[3]

Improvement in life expectancy is likely to increase the prevalence of leg ulcers in the population. Even at current levels, treatment of leg ulcers is a major economic burden.[4]

Risk factors

Features in the past history may indicate the origin.

Risks for venous ulcers[5]

- Varicose veins.

- Previous deep vein thrombosis in the affected leg.
- Phlebitis in the affected leg.
- Previous fracture, trauma, or surgery.
- Family history of venous disease.
- Symptoms of venous insufficiency: leg pain, heavy legs, aching, itching, swelling, skin breakdown, pigmentation and eczema.

Risks for arterial ulcers [6]

- Coronary heart disease.
- History of stroke or transient ischaemic attack.
- Diabetes mellitus.
- Peripheral arterial disease including intermittent claudication.
- Obesity and immobility.

Leg ulcer symptoms (presentation) [6]

The type of ulcer may be apparent from its position and associated features.

Venous ulceration

This is usually around the circumference of the lower leg from approximately mid-calf to just below the malleoli. There is often peripheral oedema.

They are larger but shallower than other ulcers. Stasis ulcers have a moist granulating base and an irregular border. This base oozes venous blood when handled. There may be varicose veins and varicose eczema.

There may be signs of stasis dermatitis around the ulcer. Hyperpigmentation is due to haemosiderin deposition or iron pigments in the skin. Lipodermatosclerosis is dermatitis followed by induration and dermal fibrosis.

There may be atrophie blanche (smooth, ivory-white plaques stippled with telangiectasias and surrounded by hyperpigmentation).

Patients often complain of mild pain that is relieved by elevation. Oedema of the lower leg is common.

Arterial ulcers

These are often more distal and on the dorsum of the foot or toes.

Initially they have irregular edges but this may become more clearly defined. The ulcer base contains greyish, granulation tissue. Handling, such as debriding these ulcers, produces little or no blood.

Nocturnal pain is typical. It is worse when supine and is relieved by dangling the legs out of bed.

There are often features of chronic ischaemia, such as hairlessness, pale skin, absent pulses, nail dystrophy and wasting of calf muscles.

Neuropathic ulcers[7]

They have a punched-out appearance with a deep sinus. These are often under calluses or over pressure points such as the plantar aspect of the first or fifth metatarsophalangeal joint.

They are often surrounded by chronic inflammatory tissue. Probing or debriding may lead to brisk bleeding. They are usually painless and the surrounding area will show diminished or absent sensation.

Pressure ulcers[1]

Pressure ulcers are caused by unrelieved pressure over bony prominences, such as the malleolus or the heel. Prolonged compression of the tissues, along with friction and shear, results in local tissue ischemia, necrosis, and ulcer formation.

Further examination

Assess the ulcerated area:

- Serial measurement (length and width) is an indicator of the success of healing.
- Tracing of the margins and photography may be helpful.
- Note the site of the ulcer.

- Assess the edge of the ulcer (shallow, punched out, rolling).
- Assess the base of the ulcer (granulating, sloughy, necrotic) and its position.
- Note the condition of surrounding skin, odour and signs of infection.

As well as inspecting the ulcer or ulcers:

- Check peripheral pulses.
- Check sensation.
- With the patient in a standing position, inspect for varicose veins. Note any peripheral oedema and varicose eczema.
- Examination of the pulse should be performed and a record taken of blood pressure and body mass index.

Differential diagnosis [7] [8]

The possibilities of arterial, venous and neuropathic ulcers have already been mentioned.

- Rheumatoid arthritis can produce a vasculitic ulcer. It is typically deep, well demarcated and punched-out on the dorsum of the foot or calf. They may also have venous disease due to poor mobility, and neuropathy, and possibly impaired healing due to use of steroids.
- Systemic vasculitis often causes multiple leg ulcers that are necrotic and deep. There is usually an atypical distribution with vasculitic lesions elsewhere such as nail-fold infarcts and splinter haemorrhages. Associated diseases include systemic lupus erythematosus, scleroderma, polyarteritis nodosa, or granulomatosis with polyangiitis.
- Diabetic ulcer is typically on the foot over a bony prominence. Neuropathic, arterial and venous components may all contribute.
- Hypertensive ulcer, due to arteriolar occlusion, is painful with necrotic edges and is usually on the lateral aspect of the lower leg.

- A malignant ulcer may be a basal cell carcinoma, squamous cell carcinoma, malignant melanoma of skin, or Bowen's disease. They are rare but must be considered if ulceration does not respond to treatment. Metabolic and haematological disease can also cause ulcers.

Investigations[1]

- Check urine for glucose unless the patient is known to have diabetes.
- In those with known diabetes, check the records for diabetic care and the level of control.
- If there is any suggestion of active infection take swabs; however, routine swabs are not recommended. Active infection should be suspected if there is:
    - Increased pain.
    - Enlarging ulcer.
    - Cellulitis.
    - Pyrexia.
- Get blood tests for FBC, erythrocyte sedimentation rate (ESR), U&E, creatinine, autoantibodies and haemoglobinopathy.
- Patch testing using the leg ulcer series should be considered for leg ulcer patients who have eczema or dermatitis.
- Having checked the brachial blood pressure in the usual way, check the blood pressure with a cuff around the calf. A larger cuff will probably be needed. Measure both sides. This enables the ankle-brachial pressure index (ABPI) to be calculated and is a more sensitive assessment of arterial disease than simply palpating peripheral pulses. Even if the ulcer is thought to be venous this is important before pressure bandages are applied. Hand-held Doppler gives a much more sensitive assessment of ABPI than auscultation.

- Venography gives little functional information and has been superseded by duplex imaging, which is indicated for patients with recurrent or complicated varicose veins, short saphenous incompetence, or suspected deep venous disease.[7] This technique can give a good functional assessment and can be used to track abnormalities of the venous circulation from the ulcer to the site of incompetence at the proximal vessels.[9] Superficial venous incompetence is almost universal and is the predominant cause of venous hypertension in approximately half of limbs with venous ulcers, particularly in younger patients with good mobility. Venous function in patients with mixed deep and superficial disease should be investigated by ambulatory venous pressure measurements.[3] This involves cannulation of a foot vein and the use of tourniquets to occlude incompetent superficial veins to select those patients who may benefit from superficial venous surgery.
- Magnetic resonance venography has been used to produce three-dimensional images that can contribute considerably to the management of recurrent varicosities.[10]
- Angiography may be helpful in assessing the viability of tissue if plastic surgery or revascularisation is considered. Magnetic resonance arteriography can also be useful.[7]
- Computerised tomography may also have a role in both arterial and venous disease.[7]
- Intravascular ultrasound can be used to determine plaque volume within the wall of an artery and/or the degree of stenosis. It can also discriminate between normal and diseased components.[7]

Interpretation of ABPI[1] [11]

- An ABPI of 1 is normal. Graduated compression bandages may be applied if the figure is 0.8 or higher.
- ABPI between 0.5 and 0.8 suggests arterial disease and requires referral to a vascular clinic for further assessment. Compression bandages are best avoided but reduced compression can be used under strict supervision if the ulcer is clinically of venous origin. Clinical progress should be checked daily initially and compression modified accordingly.

- ABPI less than 0.5 suggests arterial ulcers and compression treatment is contra-indicated. Referral should be made to a vascular clinic for further assessment and possible revascularisation.
- ABPI greater than 1.3 may suggest the presence of arterial calcification, such as in some people with diabetes, rheumatoid arthritis, systemic vasculitis, atherosclerotic disease, and advanced chronic renal failure. For values above 1.5, the vessels are likely to be incompressible.
- Microvascular disease associated with rheumatoid arthritis and systemic vasculitis cannot be assessed by ABPI. Where there is doubt, such patients should be referred for specialist assessment.

Referral[1]

Most venous ulcers can be managed in primary care but it is important to know who should be referred to a vascular or other clinic.

- Diagnostic uncertainty (to a leg ulcer clinic, tissue viability clinic, or a vascular specialist depending on clinical judgement and availability) or to dermatology.
- Ulcer is rapidly deteriorating or has an atypical location and/or appearance: refer to dermatology for a possible skin biopsy.
- Ankle brachial pressure index (ABPI) of less than 0.8: refer to a specialist vascular clinic for further assessment (if ABPI less than 0.5, refer urgently).
- Also consider referring people with ABPI greater than 1.3 as further assessments may be required to determine their suitability for compression therapy.
- Malignancy: refer to dermatology using the suspected cancer pathway referral (for an appointment within 2 weeks).
- Diabetes mellitus: refer to the diabetes ulcer clinic.
- Rheumatoid arthritis or systemic vasculitis: refer to rheumatology.
- Poor ankle mobility, reduced joint function, or a history of falls.
- Suspected iliac vein stenosis (may need investigation by CT venography and intravenous ultrasound).

- If using compression therapy, arrange specialist referral if:
    - There is a complication related to the ulcer or the treatment, eg, suspected contact dermatitis, osteomyelitis, sepsis, necrotising fasciitis or uncontrolled pain.
    - Delayed or no healing of venous ulcer after 2 weeks of compression therapy (refer to a vascular specialist or dermatologist depending on clinical judgement).
- If the ulcer is recurrent.

What to put in a referral letter

As well as the usual history of duration, treatment tried, and past medical and social history, it is important to detail a careful description of the ulcer, as follows:

- The appearance of the ulcer edge - eg, shallow, epithelialising, punched out.
- The base of the ulcer - eg, granulating, sloughy.
- The site - medial, lateral, anterior, posterior or a combination.
- A photograph.

Leg ulcer treatment and management [1] [3] [6]

This depends upon the cause but good nutrition, attention to hygiene and cessation of smoking are beneficial. UrgoStart is a range of dressings which can improve wound healing for diabetic foot ulcers and improve the rate of wound healing for venous leg ulcers.

The National Institute for Health and Care Excellence (NICE) recommends that UrgoStart is an option to treat diabetic foot ulcers and venous leg ulcers, but that there is not enough evidence to support the case for routine adoption of UrgoStart for non-venous leg ulcers. [12]

Arterial ulcers

These will usually require referral for assessment and care. It is really the management of peripheral arterial disease. See the separate Peripheral Arterial Disease article.

A Cochrane review found insufficient evidence to determine whether the choice of topical agent or dressing affects the healing of arterial leg ulcers. [13]

Neuropathic ulcers

Ulcers may occur due to abnormalities of the nerve supply to the area. The term 'neurotrophic ulcer' is occasionally seen in the literature, indicating that there is sometimes a vascular component as well.

The cause of the neuropathy must be sought. It is usually diabetes and good control is important. It may not yet have been diagnosed. If possible, the cause of the neuropathy should be treated but a reversible cause will be exceptional.

The patient must be educated about the origin of the ulcer. Pain serves a purpose. It warns us when things are wrong and usually stops us from persisting. With impaired sensation, feet should be checked every night. Attention to socks and shoes is important.

People can walk around with objects in their shoes because they cannot feel them. Check the temperature of bath water with the elbow before getting in. Do not go around with bare feet. If the blood supply is good and recurrent insults are avoided, the ulcers should heal well.

Where a vascular component exists, current management is weighted towards revascularisation. [14]

Venous ulcers

See the separate Venous Leg Ulcers article.

Mixed arterial and venous ulcers

These should be managed in a specialist clinic; they sometimes benefit from a combination of compression bandaging and revascularisation procedures. [15]

Infected leg ulcers

There was very limited evidence on the choice of antibiotics in adults with an infected leg ulcer. NICE recommends: [16]

- First-choice: flucloxacillin. The alternative first-choice antibiotics in adults with penicillin allergy or in whom flucloxacillin is unsuitable are doxycycline, clarithromycin or erythromycin (in pregnancy).
- Second-choice oral antibiotics if the first-choice oral antibiotics are not effective (guided by microbiological results when available) are the broader-spectrum antibiotics co-amoxiclav or co-trimoxazole. Cephalosporins are not an appropriate option as a second-choice oral antibiotic because they do not provide adequate cover for anaerobes.
- Oral antibiotics should be given first line if possible. Intravenous antibiotics may be required if severely unwell or unable to take oral antibiotics.

Complications[1]

- Infection: wound infection, cellulitis, osteomyelitis, sepsis.
- Chronic pain.
- Immobility.
- Poor quality of life with psychological distress and restriction of usual daily activities.

Prognosis[1]

The prognosis will vary with the nature of the ulcer, any complication, general wellbeing and co-morbidities of the patient.

Adverse prognostic indicators include longer duration of ulcer, greater size of ulcer, poor compliance with advice and treatment, and lower socioeconomic group.

The National Institute for Health and Care Excellence

Further reading

- Coull AF, Atherton I, Taylor A, et al; Prevalence of skin problems and leg ulceration in a sample of young injecting drug users. Harm Reduct J. 2014 Aug 13;11:22. doi: 10.1186/1477-7517-11-22.
- Bui UT, Finlayson K, Edwards H; The diagnosis of infection in chronic leg ulcers: A narrative review on clinical practice. Int Wound J. 2019 Jun;16(3):601-620. doi: 10.1111/iwj.13069. Epub 2019 Jan 29.

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