LEG ULCERS

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Extensive ulcer of lower leg with necrosis and granulation tissue.

Ulceration of the lower leg is a common symptom that will affect 2% of people in their lifetime. Its prevalence increases with age from 0·5% among patients over 40 to 2% among those over 80. As the proportion of elderly people in the population increases, therefore, we can expect a rise in the present estimated numbers of leg ulcers unless a more educated approach to their management is taken.

Although some patients tolerate their ulcers, to others the condition is smelly and painful, resulting in time off work (500 000 working days/year), perhaps loss of a job, social isolation, and—in a few cases—complete disability. Though important advances have been made in the management of many chronic conditions, the management of leg ulcers in some parts of the United Kingdom lags far behind the standards set by some European countries. Treatment is fragmented, poorly taught, and inadequately researched; the average time taken to heal an ulcer is about six months; and some persist for years.

The present annual expenditure on the treatment of ulcers in the United Kingdom is about £50m—a large market for new products for ulcer care. Good management, however, depends on accurate diagnosis, simple and appropriate care of the wound, and treatment of the underlying cause.

Diagnosis

95% of leg ulcers are vascular, other causes are:

Neuropathy:	Haematological:
Diabetes	Sickle cell disease
Alcohol	Miscellaneous:
Infection	Pyoderma gangrenosum
Trauma	Pressure sores
Cancer (squamous)	

Rare causes of leg ulcers

Arteriovenous malformation	Kaposi's sarcoma
Syringomyelia	Haemolytic jaundice
Syphilis	Leukaemia
Basal cell cancer	Factitious causes
Melanoma	Drugs

Estimated number of arterial leg ulcers treated each year

	District of 200 000 people	United Kingdom
Venous	200	63 000
Arterial (large vessel)	30	9 000
Arterial (small vessel)	15	4 500
Venous/arterial	30	9 000

A detailed history is essential because although most ulcers are caused by venous disease, other common causes—arteriosclerosis of main vessels, neuropathy, and disease of the small arteries—must not be missed. A venous ulcer is easily recognised when it is situated in the "gaiter" region near the medial malleolus, and occasionally adjacent to the lateral malleolus; it has a shallow base with a flat margin and the surrounding skin has features of long standing venous hypertension—haemosiderin pigmentation, atrophie blanche, eczema, and dilated venules over the instep of the foot (lipodermatosclerosis). In some cases ulcers may become circumferential.

Ischaemic ulcers can occur anywhere below the knee, but are most commonly seen on the foot and they are more likely to be painful than venous ulcers. The diagnosis may be difficult as—particularly in elderly people—there may be no history of claudication. These ulcers are often deep and invade deep fascia, tendon, and bone; associated local signs include pallor, dependent redness, dystrophic nails, reduced skin temperature, sluggish venous filling, and poor capillary return.

When arterial insufficiency is suspected or when oedema and local induration do not permit confident assessment of peripheral circulation, it is simple to auscultate the arteries with a portable Doppler scanner and—with a sphygmomanometer placed around the calf—measure the systolic pressure in each of the three ankle vessels (peroneal, anterior tibial, and posterior tibial). The ratio of ankle:brachial pressure is a guide to the severity of the arterial disease. The routine use of Doppler ultrasound has shown that at least 10% of venous ulcers are accompanied by unrecognised arterial disease and it is these patients who are easy to mismanage. Any ulcer

Ulcer resulting from small vessel arteritis.

Ulcer following trauma in a patient with peripheral neuropathy

Principles of management:

- Define the cause
- Treat the ulcer carefully
- Treat the underlying cause

with associated arterial disease should be referred to a vascular surgeon as inappropriate compression may cause irreversible tissue damage that will require amputation of the limb.

When foot pulses are easily palpable, appreciable atherosclerotic obstruction of the large vessels is unlikely so disease of the small vessels associated with diabetes, rheumatoid arthritis, and autoimmune diseases must be considered, particularly if multiple "punched out" ulcers are present. Thrombocythaemia and polycythaemia may also lead to ulceration and when venous disease is also present the diagnosis is easily missed. Until the underlying disease is treated or goes into remission the "venous" ulcer may remain unhealed despite otherwise adequate local treatment.

Skin cancers comprise up to 2% of ulcers seen in specialist clinics and are easy to misdiagnose unless the possibility of malignancy is kept in mind and a biopsy specimen taken. Features that suggest such a diagnosis include unusual or overabundant granulation tissue and rolled irregular edges; these may be either presenting features or they may develop in an ulcer that has remained unhealed for many years and undergone malignant change (Marjolin's ulcer). Early referral of patients with atypical ulcers, or ones that will not heal, will avoid inappropriate treatment.

Before outlining the treatment of leg ulcers we must emphasise that their prevention is of primary importance; patients with vascular disease or neuropathy affecting the legs have an increased risk of ulceration and should be advised and treated accordingly. Only a small proportion of patients with venous insufficiency will ever develop an ulcer even if deep venous insufficiency is present. Skin changes—in particular lipodermatosclerosis—around the malleoli should alert the practitioner to advise the patient to avoid local trauma, and complications such as eczema or ulceration require prompt treatment. Below knee stockings should be worn all day, and patients with arteriopathy or neuropathy, or both (especially diabetic patients), should be given advice about footwear and foot care and—if necessary—be referred to a chiropodist with a special interest in such problems.

Treatment

Factors impairing wound healing

Local:	General:
Reduced blood supply	Age
Infection	Anaemia
Mechanical stress	Steroids
Denervation	Diabetes
Iatrogenic	Uraemia
Presence of tumour	Malnutrition
	Vitamin deficiency
	Zinc deficiency
	Ambient temperature

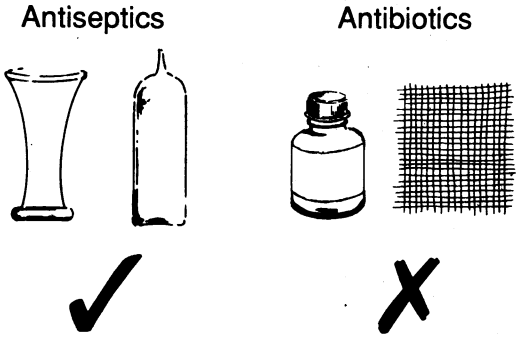
There is no universally correct way to treat an ulcer as each patient's age, general health, social circumstances, and physical state must be taken into account. Anyone treating leg ulcers, however, from district nurse to consultant, must always be aware that there are two aspects of treatment—to promote healing by second intention and to treat the underlying cause. The decision about whether to treat patients in the community, refer them to a specialist clinic, or admit them to hospital must be based on local facilities and the response of the ulcer to initial treatment.

Local treatment to encourage healing by second intention

Soft tissue wounds heal by a complex process starting with granulation and progressing by migration of epithelium from the edges of the wound. Treatment of the systemic factors is self explanatory but the deleterious effects of steroids applied topically or given systemically, malnutrition (especially in elderly people), and the vasoconstrictive effects of a consistently low ambient temperature may be forgotten.

An ulcer may quickly become colonised by a wide variety of bacteria, so frequent cleansing with removal of slough and dead tissue is essential. Many products are promoted for their cleansing and healing effects with little or no clinical evidence to support their use. There is experimental evidence that certain commonly used cleansing agents (for example, eusol, chlorhexidine, and hydrogen peroxide) are toxic both to bacteria and to cells, and may therefore retard healing; others that contain lanolin (including all steroid ointments), hydroxybenzoates (Aserbine and

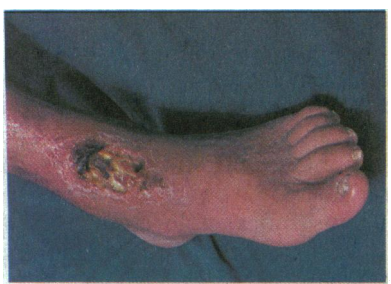
Extending infected ulcer with necrosis in a patient with pyoderma gangrenosum.



Preparations for local treatment

	No of preparations	
	Available	Recommended
Disinfectants/ cleansing agents	>30	Saline Povidone iodine Silver sulphadiazine Potassium permanganate
Dressings	>18	Paraffin gauze Sterile gauze
Medicated bandages		Cotton impregnated with zinc paste and hydroxybenzoates Cotton impregnated with icthammol and zinc oxide
Retention bandages	>12	Stretch fabric or tubular seamless gauze
Support stockings	>30	Medium/high compression (25-40 mm Hg)

Stasis ulcer.



Deep ulcer with necrosis caused by tight bandaging of a leg with arterial disease.

Malatex), chlorocresol (Betnovate cream), colophony (Secaderm), and neomycin often cause sensitivity reactions that complicate the treatment.

Our advice is to debride dirty ulcers with a scalpel and forceps; when necessary a local anaesthetic can be applied topically or injected subcutaneously around the ulcer away from its edge. Eusol or hydrogen peroxide may be used instead of a scalpel but should be used only for limited periods; sterile saline or boiled tap water may then be used to wash the ulcer. Some particularly large or deep ulcers may require treatment in hospital by debridement under general anaesthesia.

Skin surrounding ulcers, particularly vascular ulcers, is rarely normal. Hyperkeratosis is common and usually the result of poor local hygiene or infrequent dressings. Excessive keratin harbours bacteria and may obscure other ulcers so it should be removed with tissue forceps; sometimes it is necessary to apply arachis oil or paraffin gauze for several days before attempting debridement. Patients should be encouraged to bathe with the leg wrapped in a polythene bag, or just before a visit by the district nurse so that the dressing can be soaked off. Peeling off an adherent dressing should be avoided as it may avulse granulation tissue and regenerating epithelium.

Antiseptics applied topically are acceptable, but antibiotics applied topically should be avoided. We recommend povidone iodine as the antiseptic for general use, silver sulphadiazine for short periods if *Pseudomonas* spp have been cultured, and potassium permanganate (1/8000 dilution) for wet ulcers with surrounding eczema—but again only for limited periods as it can cause local hyperkeratosis.

When cellulitis is present a swab of the ulcer must be taken before an antibiotic is prescribed; the most likely organism is *Staphylococcus aureus*. Further measures must include rest with elevation of the limb. Failure to respond to treatment, increasing cellulitis, or rapid enlargement of the ulcer, warrant immediate referral to hospital for treatment with systemic antibiotics.

What about non-adherent dressings and occlusive dressings? There is no such thing as a non-adherent dressing but paraffin gauze cut to the shape of the ulcer, three to four layers thick, is cheap and better than all the others. Occlusive dressings may offer some advantages but they can aggravate local infection and their place in the management of ulcers has yet to be established. Skin is the best dressing and can be applied either as a partial thickness graft or as numerous pinch grafts. It is best reserved for large ulcers or those that will not heal by conservative treatment, and success rates of up to 90% can be achieved by selecting cases carefully, cleaning the ulcers, careful follow up, and treating the underlying cause.

Treating the cause

As with any other medical problem treatment is often a compromise between what should be done, what can be done, and what the patient wants to be done. General advice on weight loss, regular exercise, and ankle exercises to improve venous return should be given, together with a simple explanation of the rationale of the treatment to improve compliance.

Adequate graduated compression is sufficient to heal most venous ulcers; below knee compression stockings that exert a pressure of at least 20-25 mm Hg at the ankle are most suitable and should heal 80-90% of venous ulcers that are <10 cm^2 within three months. Unfortunately the stockings that provide this degree of compression (Venosan 2002, Sigvaris 504, Jobst, and Medi) are not available except on prescription in hospitals.

The two main drawbacks to high grade compression stockings—discomfort and difficulty in application—may be overcome by simple modifications in policy. If high grade compression is unbearable, then TED stockings, two layers of Tubigrip, or a well padded paste bandage—though they give less compression—may still heal the ulcer, after which compression can be increased. Elderly or infirm patients who cannot apply the stockings should wear them continuously and the district nurse or a relative may change them twice a week. Advice on other measures to control oedema is equally important—never stand when you can sit, never sit when you can lie down (preferably with the legs above the level of the chest), and put blocks under the foot of the bed or sleep with the legs on a pillow, or both. When ankle movements are restricted, simple exercises, physiotherapy, and regular attention to gait should improve the function of the calf muscles and the venous return.

Stasis ulcer with eczema and pigmentation.

Ischaemic ulcers require a different approach as they may lead to irreversible ischaemia and amputation. A vascular surgeon's opinion should be sought early even for elderly patients as major reconstructive surgery, percutaneous transluminal angioplasty, or a chemical (phenol) sympathectomy may be beneficial. The presence of both venous and arterial disease in an ulcerated leg complicates management as their relative contributions to the pathophysiology are difficult to define even after extensive investigations. On the one hand graded compression may aggravate local ischaemia, and on the other hand improved arterial inflow may aggravate the venous insufficiency.

A manageable balance by the year 2000?

Estimate of possible savings

Assuming:

- It takes one hour/week to dress each ulcer
- It costs £10/week to dress each ulcer
- Average time to healing is six months

Then:

- Healing time of 100 ulcers can be reduced by two months
- The total number of ulcers is reduced by 50 after a year

So:

- Savings=Dressings £22 000
  Nursing time £10 000

Failure to heal a leg ulcer is usually the result of poor clinical acumen or inappropriate care of the wound; the blame rarely lies with the patient, though there are a few patients whose comprehension and motivation will never permit more than temporary success. With increasing numbers of people living to be over the age of 80 the incidence of leg ulcers may double by the year 2000, so unless a concerted effort is made to improve treatment and prevent recurrence resources will have to be increased or patients will suffer. New and more expensive dressings are not the answer until we assess critically the results of our present treatments.

The number of leg ulcers in a community can be reduced by a combination of active management, a simple and unified policy of treatment within a district with nurses specifically appointed to manage leg ulcers, and a specialist clinic for the assessment of the intractable, painful, and large ulcers. Improvements in healing time with a reduction in total numbers could achieve substantial savings within one or two years. With a more unified approach proper clinical trials of specific problems could further improve ulcer care with consequent savings of time and money.

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The ABC of Vascular Diseases has been edited by Mr John H N Wolfe.