

## Aetiology and management of leg ulcers – an enigma

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### ABSTRACT

Chronic leg ulcer is defined as a defect in the skin below the level of knee persisting for more than six weeks, which shows no tendency to heal after three or more months. Leg ulcers are debilitating and greatly reduce patients' quality of life. The common causes are venous disease, arterial disease and neuropathy. Management of patients with chronic ulcers has to be multidisciplinary and should include detailed history, physical examination, investigations, basic and newer treatment modalities, and educating patients on issues of correct foot care and the importance of seeking early medical advice.

KEY WORDS: Leg ulcer, management, venous, arterial, diabetes, insufficiency, neuropathic

### INTRODUCTION

Chronic ulceration of the lower legs is a relatively common condition amongst adults, one that causes pain and social distress.<sup>1</sup> The condition affects 1% of the adult population and 3.6% of people older than 65 years.<sup>2</sup> Chronic ulceration of the lower legs is a relatively common condition amongst adults, and ulcer symptoms usually include increasing pain, friable granulation tissue, foul odor, and wound breakdown instead of healing.

It has been reported that ulcers related to venous insufficiency constitute 70%, arterial disease 10%, and ulcers of mixed etiology 15% of leg ulcer presentations.<sup>3</sup> The remaining 5% of leg ulcers result from less common pathophysiological causes, and this latter group comprise considerable challenges in diagnosis, assessment, and management. Leg ulcers are mainly caused by venous insufficiency, arterial insufficiency, neuropathy, diabetes (Fig. 1), or a combination of these factors.<sup>4</sup> Venous ulcers are the most common



Fig. 1 Figure showing diabetic ulcer.

type of leg ulcers, accounting for approximately 70% of cases.<sup>5,6,7</sup> Arterial disease accounts for another 5% to 10% of leg ulcers; most of the others are due to either neuropathy (usually diabetic) or a combination of those diseases. The study from India shows that etiology of chronic wounds included systemic conditions such as diabetes, atherosclerosis, tuberculosis, and leprosy.<sup>8</sup> Other major causes included venous ulcers, pressure ulcers (Fig. 2), vasculitis, and trauma. Venous

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**Fig. 2** Figure showing multiple pressure foot ulcers.

ulcers most commonly occur above the medial or lateral malleoli.<sup>9,10</sup> Arterial ulcers often affect the toes or shin or occur over pressure points. Neuropathic ulcers tend to occur on the sole of the foot or over pressure points.

## DISCUSSION

Venous ulceration is the most common type of leg ulceration. 60% to 80% of leg ulcers have a venous component. Venous ulcers arise from venous valve incompetence and calf muscle pump insufficiency which leads to venous stasis and hypertension.<sup>11</sup> This results in microcirculatory changes and localised tissue ischaemia. The natural history of the disease is of a continuous cycle of healing and breakdown over decades, and chronic venous leg ulcers are associated with considerable morbidity and impaired quality of life. Venous circulation of the lower extremities progresses from the superficial to perforating to deep veins, with valves in each system to ensure unidirectional blood flow.<sup>12</sup> As the calf muscles contract, the pumping action causes the blood to flow from the deep veins into the inferior vena cava. Disease of these pathways results in

venous insufficiency. Venous ulcers (Fig. 3) are more common in women and older persons. The primary risk factors are older age, obesity, previous leg injuries, deep venous thrombosis, and phlebitis. Venous ulcers are often recurrent, and open ulcers can persist from weeks to many years. Severe complications include cellulitis, osteomyelitis, and malignant change.<sup>13</sup>



**Fig. 3** Figure showing venous ulcer of the lower limb.

In venous disease, ulcers are usually located in the gaiter area between the ankle and the calf, often on the medial aspect of the leg. Venous ulcers arise from venous valve incompetence.<sup>14</sup> Valvular incompetence in the deep veins causes the vessels to become distended and stretched to accommodate the additional blood flow. The valves are not able to effectively close, which results in retrograde blood flow and venous hypertension.<sup>15</sup> The venous hypertension, leads to leakage of fluid out of the stretched veins into the tissues, causing deposition of a brownish/red pigment in the gaiter area of the leg. Venous ulceration occurs in the gaiter area in 95% of cases especially around the malleolar (the rounded protuberances on the ankle) region. Veins can be damaged by surgery, trauma, or DVT, which causes a backflow of blood in the venous system at the point of damage. Other causative factors include multiple pregnancies, obesity, congenital vein abnormalities, and varicose veins. Venous

ulcers are commonly associated with varicose eczema which is characterised by erythema, weeping, scaling and pigmentation, and may be misdiagnosed as infection. Venous ulcers are also prone to get complicated by allergic contact dermatitis. The clinical appearance of varicose eczema and allergic contact dermatitis is similar, but the distribution and response to treatment provide useful diagnostic information.<sup>16</sup>

The management of leg ulcers should include a detailed history of the onset of the problem, examination of the legs and skin, investigations, and modalities of treatments. The first step toward diagnosis of any leg ulcer is to compile a comprehensive history and assessment of the patient. This should include general health status, social and occupational situation, past and current medical history of relevant diseases (such as deep vein thrombosis, diabetes, autoimmune disorders, inflammatory bowel disease, and connective tissue disease), condition of the skin, current vascular status, limb size and shape, and history and status of the ulcer.<sup>17,18</sup> The patient should be asked about lower extremity pain, paresthesia, anesthesia, and claudication. It is important to determine the duration of ulceration and whether it is a first episode or recurrent. Pain is a major problem for patients with leg ulcers unless there is a neuropathic component. Lack of pain, therefore, suggests a neuropathic aetiology. Patients should also be asked about their mobility. The examination of the leg should include palpation of pulses and a search for the signs of venous hypertension, including varicose veins, haemosiderin pigmentation, varicose eczema, atrophie blanche, and lipodermatosclerosis. The ulcer examination should include site, size, appearance, wound base, exudates level,

and surrounding skin. The surrounding region should be examined for pain, edema, erythema, warmth, induration, discoloration, maceration, dryness, scarring from previous wounds, hair pattern, gangrenous digits, clubbing, cyanosis, capillary refill, and varicose veins. It is important to bear in mind that venous and arterial disease may coexist in the same patient. The venous ulcers considerably differ from arterial ulcers and other ulcers of lower extremity. An irregular ulcer border, black necrosis, erythema, or bluish or purple discolorations of adjacent skin are suggestive for ulcer due to vasculitis. A painful leg ulcer with violaceous borders suggests pyoderma gangrenosum.

For the management, of leg ulcers, The leg should be assessed for signs of venous disease, in particular, varicose veins, venous dermatitis, haemosiderin deposition, lipodermatosclerosis and atrophie blanche.<sup>19,20</sup> A venous duplex scan may aid assessment of the leg. Oedema should be assessed and non-venous causes of unilateral and bilateral oedema ruled out. Joint mobility, particularly that of the ankle, is an important component of calf muscle pump function and should be carefully recorded. It is important to assess arterial supply with respect to safety of compression therapy, which is the standard treatment for venous leg ulcers. Palpation of pulses alone is not adequate to rule out peripheral arterial disease. Measurement of the ankle brachial pressure index (ABPI) of both lower limbs by hand held Doppler device is the most reliable way to detect arterial insufficiency.<sup>21</sup> Ulcerated legs should be washed normally in tap water and carefully dried. Necrotic material or slough within a wound margin acts as a medium for bacterial proliferation and therefore should be removed

by debridement.<sup>22,23</sup> General care of the skin surrounding an ulcer is essential to maintain skin integrity and minimise the risk of further ulceration. The peri-ulcer skin should be treated routinely with a bland emollient, and ulcer margins should be coated with a barrier preparation to prevent maceration of surrounding skin. Uncomplicated venous dermatitis usually responds to emollients, but often topical corticosteroids may be required. Failure to respond to a moderately potent steroid is an indication for patch-testing.

The effectiveness of graduated compression stockings in achieving and maintaining healing is dependent on the correctness of fit and the pressure generated beneath the stocking.<sup>24</sup> Compression bandaging is the most effective treatment for venous leg ulcer. The bandages work by helping push the blood in leg veins back up to heart. The type of bandage will be decided by health care professional following discussion with the patient. Different strengths are available and healthcare professional will help select the best one - aiming to find the strongest that the patient is able to wear. A dressing is worn under the bandage. And is changed when required, usually once a week, by healthcare professional. When the dressing is changed, patient should take the opportunity to gently wash the leg in warm tap water. Waterproof protectors are available for bathing/showering at home between dressing changes. In clinical and laboratory testing, not all stockings produce an adequate pressure or pressure gradient, although they may be described as of a similar class. Patients should be offered the strongest compression which they can tolerate to prevent ulcer recurrence. Patients should be informed that it is likely that compression will be

required indefinitely. If a patient finds a stocking uncomfortable, changing the brand of stocking within the same class may improve compliance. Advise patients, who experience pain in their calf when walking that this may be an indication of arterial disease and may affect their treatment options. The compression treatment with bandages or with a stocking is the single most important treatment for a leg ulcer, and is far more important than the ulcer dressing.<sup>25,26,27</sup> Ensure that patients are aware of the need for a weekly change of bandage and that more frequent changes may be required in certain circumstances. Encourage patients to wash their leg gently in warm tap water when bandages are being changed. Advise patients that antibiotic tablets are only needed very occasionally. Explain to patients that they may be offered pentoxifylline tablets to help improve their blood flow which may help their leg ulcer to heal. The following advice should be offered to patients and carers during treatment of leg ulcers: When resting, patient should try to keep ankles up higher than their heart. This allows the fluid to drain from legs. At night time it is important that one keeps to ones normal sleeping habits, and sleeps in the bed rather than in a chair. Raising the foot of the bed at night, if tolerable will help to assist venous return. Dry scaly skin needs to be treated with a non-perfumed moisturiser (emollient) to keep the skin moist.

## CONCLUSIONS

An ulcer which is present for more than three months is considered as chronic ulcer. The majority of chronic leg ulcers are caused by venous insufficiency followed by arterial ulcers. A comprehensive assessment of the patient, limb,

and ulcer is required to determine etiology and to formulate an appropriate management plan. The patients should be explained about the benefits of exercise and the need to wear compression hosiery from the time one gets up in the morning until going to bed at night, renewing hosiery every 3-6 months, keeping mobile and elevating their legs when resting.

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