

LEG ULCERS: DIFFERENCES BETWEEN VENOUS AND ARTERIAL

Leg ulceration is a common condition particularly amongst the elderly, affecting approximately 1–3% of the UK population (Callum et al, 1985). The two main causes of leg ulceration are venous insufficiency and arterial disease. This article explains the importance of understanding the differences between these two conditions.

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Leg ulceration is a condition that mainly affects older people, however, it can occur at all ages and particularly to those with increased risk factors, such as obesity, smoking, hypertension and a history of deep vein thrombosis.

There are two main types of leg ulceration: venous and arterial. Because of their underlying pathology, each requires different management approaches.

The key to effective management lies in the accurate and thorough assessment and diagnosis of the condition, which is only achievable if clinicians are knowledgeable and experienced in leg ulcer assessment.

Usually, the first point of contact for patients is a member of their community nursing team. According to the Royal College of Nursing clinical practice guidelines (RCN, 2006), successful leg ulcer management is dependent upon accurate assessment as well as the formulation of a differential

diagnosis undertaken by a clinician, preferably trained in leg ulcer management.

As defined by the Scottish Intercollegiate Guideline Network (SIGN, 1998), leg ulceration is 'a break in the skin on the lower leg, which takes more than 4–6 weeks to heal'. In order to effectively manage this type of skin breakdown, it is important to identify the underlying cause.

As Davis et al (1992) suggests, 'leg ulcers are chronic wounds arising from predisposing conditions that impair the ability of the tissue to maintain its integrity or heal damage'. For example, the patient may have already experienced trauma to the lower leg many years earlier.

Following the development of an ulcer, there may be delayed healing due to underlying venous disease, caused by damage to the valves or deep veins. This article will explore the differences between venous and arterial leg ulcers and explain their underlying pathophysiology.

Pathophysiology

The circulatory system of the

body is a complex network of blood vessels, which play an important part in sustaining life. If these vessels become diseased or damaged then skin breakdown can occur, or an existing wound could fail to heal.

Veins

Veins usually carry deoxygenated blood towards the heart. They are often closer to the skin than arteries. Most veins have one-way flaps or valves that prevent blood from flowing backwards and pooling in the lower legs.

If the valves become diseased or damaged they become incompetent, causing blood to flow back from where it came from, instead of to the heart. This leads to an increase in pressure within the deep venous system causing the vein walls to stretch, opening up the valves and allowing even more blood to fill the veins.

Veins are classified as superficial and deep. Superficial veins are close to the body surface and have no corresponding arteries. The long saphenous vein is the most important superficial vein in the lower limb, running from the dorsal vein at the big toe to join

the femoral vein at the sapheno-femoral junction at the top of the thigh. Deep veins are found much deeper within the leg and all have corresponding arteries, with similar names, running alongside them.

Examples are the perineal and femoral veins. It is within the deep veins where blood clots form, causing a deep vein thrombosis (DVT), which is one of the main causes of venous hypertension. Perforator veins connect the deep and superficial venous systems and have one way valves.

Arteries

Arteries usually carry oxygenated blood from the heart. It is the systemic arteries that feed the whole body. Nutrients and gases are exchanged in the arterial system, and due to the pressure variations within the arteries, blood pressure is regulated.

The femoral, anterior and posterior tibial and perineal arteries all supply blood to the lower legs, but are at risk of becoming diseased or blocked – giving rise to arterial leg ulcers.

Atheroma, or plaque in the artery wall, is a build-up of cell debris causing stenosis (narrowing of the artery), which reduces the amount of blood flowing through the artery.

The flow of oxygen and nutrients is decreased in tissue areas fed by that artery, and over time the tissue breaks down causing ulceration. Arteries can also become completely occluded, which can threaten limb viability if not treated quickly.

Understanding the underlying pathology of both venous and arterial leg ulceration is an essential criterion for any clinician looking after patients who present with lower leg wounds.

The assessment criteria are based on pathological changes that should be well understood to ensure the diagnosis is correct.

Venous leg ulceration

Venous leg ulcers are the most common type of leg ulceration, accounting for approximately 70% of patients diagnosed (Callum et al, 1985).

They occur as a result of sustained venous hypertension, caused by venous insufficiency. Superficial vein incompetence and/or perforating vein incompetence (when the vein fails, such as with direct injury, congenital abnormality or superficial inflammation) cause 40–50% of venous leg ulcers. In these patients, the deep veins function as normal (Grey et al, 2006).

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.

The vein walls stretch to compensate for the increased blood, but in turn, this causes venous hypertension. Within the circulatory system, unequal pressure develops between the arteries and the veins and if left untreated venous hypertension

can become chronic. Due to the high pressure, red blood cells leak into the extravascular space. Haemosiderin (an iron storage complex which is found within the cells rather than in circulating blood, commonly found in macrophages) is released from the red blood cells and breaks down.

This fluid then leaks out of the stretched veins into the tissues, depositing a brown/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 (Grey et al, 2006).

Waste products from blood proteins and fibrinogen also leak into the tissues, which can irritate the skin causing venous eczema.

Patients with venous disease are at an increased risk of developing allergic reactions to certain products known as allergens because of this process. Leg ulcer allergens can be found in a wide range of topical treatments such as emollients, medicaments, dressings, bandages and hosiery (Newton and Cameron, 2003).

Another factor that influences the development of venous leg ulcers is calf muscle pump failure. The calf muscle, through contraction and relaxation, aids in the flow of blood back to the heart through the veins.

As the ankle is flexed, the shape of the calf muscle changes, becoming wider and flatter, exerting pressure on the veins (Anderson, 2009). Failure of this mechanism causes stasis

of blood and increased venous pressure. Calf pump failure arises from paralysis, immobility, sleeping in a chair with legs dependant for long periods of time and fixed ankle joints.

When pressure builds up in the venous system, certain skin changes occur. These visual signs can be helpful for supporting the aetiology of the leg ulcer. The leg can become oedematous (presence of excessive fluid) as increased pressure in the capillaries cause dilation.

Fluid leaks onto the subcutaneous cells and into the interstitial spaces, which causes oedema. Gaseous exchange is slower within the microcirculation and there is reduced tissue oxygenation.

The tiny veins on the medial aspect of the ankle dilate due to the increase in pressure. This is known as ankle flare and also causes atrophy of the veins, which are prone to damage, especially around the lower ankle area.

As the venous hypertension becomes chronic, the tissues begin to fibrose and develop a woody appearance. The shape of the lower leg can change into what is described as a 'champagne bottle' appearance. Lipodermatosclerosis is a term used to describe the combination of changes in the lower leg from venous hypertension.

As a result of venous congestion and the loss of intercellular fluid balance, the skin can become very dry and flaky. The build-up of hyperkeratotic (excessive dry,

scaly skin) skin is also an indicator of high venous pressure.

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.

Arterial leg ulceration

Arterial leg ulcers occur as a result of reduced arterial blood flow and subsequent tissue perfusion. Atherosclerosis or peripheral vascular disease is the most common cause of arterial leg ulceration (Moffatt, 2001).

Atheroma or plaque development can be caused by smoking, obesity, hyperlipidaemia, hypertension and diabetes, and usually affects men over 45 years and women over 55 years (Grey et al, 2006).

As the arterial blood supply reduces, patients experience an increase in pain. Their ability to walk distances and uphill causes pain, which is also present on leg elevation. This is known as intermittent claudication (limping).

On exercise and elevation, blood flow is reduced, causing hypoxia in the muscle nearest to the site of the atheroma. Patients experience a cramp like pain, which is often relieved by hanging the leg in a dependant position. Pain is also experienced at night and at rest.

A reduction in blood supply, if left untreated, can cause death of tissue in the area being fed by the affected artery. Ulcer development is often rapid with

deep destruction of tissue. The limb looks pale and there is a noticeable lack of hair.

Capillary refill is reduced and pedal pulses are weak or absent. A delay of more than 10–15 seconds in return of skin colour after raising the leg to 45 degrees for one minute indicates vascular insufficiency.

This is known as the Buerger's test (Install, Davies, Prout, 1989). Arterial leg ulcers can occur anywhere on the lower leg and are often deeper and rounded, with clearly defined borders.

Assessment of leg ulceration

Undertaking a thorough patient assessment using specific criteria is essential in order to differentiate between the two types of leg ulceration.

Table 1 provides a summary of the differences between venous and arterial leg ulcerations. Many assessment tools are based on these criteria.

Conclusion

As described, the assessment of patients who present with lower limb ulceration is an important aspect of a clinician's role.

Education and training is vital for all those involved in caring for patients with both venous and arterial ulceration, as is the ongoing sharing of best practice.

Talking to patients can provide real insight into their experience of living with a leg ulcer. Research highlights the importance of treating patients as individuals

Table 1.

Assessment of leg ulcers; the difference between venous and arterial disease

Assessment criteria	Venous disease	Arterial disease
Presenting history, physical and social risk factors	<ul style="list-style-type: none"> » Previous history of DVT » Varicose veins » Reduced mobility » Traumatic injury to the lower leg » Obesity » Pregnancy » Non-healing ulceration » Recurrent phlebitis » Previous vein surgery 	<ul style="list-style-type: none"> » Diabetes » Hypertension » Smoking » Previous history of vascular disease » Obesity » Inability to elevate limb
Position of ulceration	<ul style="list-style-type: none"> » Gaiter area of the leg » Common site is medial aspect 	<ul style="list-style-type: none"> » Lateral malleolus and tibial area are common sites as well as toes and feet » Over pressure points
Pain	<ul style="list-style-type: none"> » Throbbing, aching, heavy feeling in legs » Improves with elevation and rest 	<ul style="list-style-type: none"> » Intermittent claudication » Can be worse at night and at rest » Improves with dependency
Ulcer characteristics	<ul style="list-style-type: none"> » Shallow with flat margins » Often presents with slough at the base with granulation tissue » Moderate to heavy exudate 	<ul style="list-style-type: none"> » Punched out, occasionally deep » Irregular in shape » Unhealthy appearance of wound bed » Presence of necrotic tissue or fixed slough » Low exudate unless ulcers infected
Condition of the lower leg	<ul style="list-style-type: none"> » Haemosiderin staining » Thickening and fibrosis » Dilated veins at the ankle » Crusty, dry, hyperkeratotic skin » Eczematous, itchy skin » Pedal pulses present » Normal capillary refill (less than three seconds) » Limb oedema is common 	<ul style="list-style-type: none"> » Thin, shiny, dry skin » Reduced or no hair on lower leg » Skin feels cooler to touch » Pallor on leg elevation » Absence or weak pedal pulses » Delayed capillary refill (greater than three seconds) » Development of gangrene

and acknowledging that for this patient group, their quality of life is reduced (Palfreyman, 2008).

In some cases, where the ulcers become chronic, management is complex. Taking a clear history as well as patient and ulcer assessments can help to identify

the specific indicators, which guide accurate diagnosis. It should be recognised that some patients, however, can have a combination of arterial and venous disease and, therefore, an awareness of all factors that influence leg ulcer development are imperative. **WE**

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Key points

- » The assessment of patients who present with lower limb ulceration is an important aspect of a clinician's role.
- » Education and training is vital for all those involved in caring for patients with both venous and arterial ulceration.
- » Talking to patients can provide real insight into their experience of living with a leg ulcer.
- » Taking a history as well as ulcer assessments can help to identify the specific indicators, which guide accurate diagnosis.

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