Lower limb assessment

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Lower limb Assessment in Adult Patients

'at a glance clinical review article for commissioned series'.

This article will:

- Provide clinical guidance on early indications for chronic venous insufficiency
- Increase knowledge on lower limb assessment
- Provide an awareness of the complications in the lower limb

Chronic venous insufficiency

Chronic venous disease is a common problem that is often overlooked by healthcare practitioners. It is estimated to affect ≥30% of the adult population although this is difficult to calculate due to a significant number of under-diagnosis (Radak et al., 2016). Venous disease is considered to cost is between 600 – 900 million to 2.5 million euros a year across Western Europe (Radak et al., 2016; Rabe and Pannier 2010). These costs include investigations, treatment and management, deterioration of quality of life and loss of working days (Rabe and Pannier 2010). The main risk factors of chronic venous insufficiency (CVI) increases with age and obesity. It is therefore recognised that the prevalence is slowly rising increasing the socioeconomic burden (Rabe and Pannier, 2010).

Venous blood flows from the skin to the superficial veins (found in the subcutaneous tissue), which drain into the deep veins. Bicuspid valves in the veins function to keep blood moving in one direction and prevent backflow of blood. Venous insufficiency is an impaired flow of blood through the veins caused by valve incompetence (where the values are unable to close

completely) (Woods, 2019). Blood leaks back through the value and pools in the superficial veins increasing pressure which can further weaken the values and cause irreparable damage. Editor, please include a picture of incompetent valve

Risk factors

Venous insufficiency includes a broad spectrum of venous complaints which range from telangiectasias or spider-webs to chronic venous ulcers and deep vein thrombosis (Ballard & Bergan, 2000). The risk factors for venous insufficiency include age which increases in both men and women, sex; the majority of the research indicates that women are more likely to have varicose veins (Ballard & Bergan, 2000). Genetics, occupation (prolonged standing), pregnancy, and diet: some evidence suggests that a western diet of reduced fibre and refined foods leads to constipation and intra-abdominal pressure from straining is transmitted to the veins in the legs (Ballard & Bergan, 2000). Obesity, heavy lifting, smoking, reduced mobility and hematologic factors (Woods, 2019). Increased venous pressure; over time leads to a chronic inflammatory response, which can cause the breakdown of tissue resulting in venous leg ulceration (Wounds UK, 2016).

Assessment

Early intervention, assessment and diagnosis is essential to reduce the burden of CVI and improve quality of life. The CEAP classification tool is a standardised method used in the management of CVI (Eklof et al., 2004). Originally established as a tool to assess for recurrent varicose veins it identifies early signs of venous disease (Eklof et al., 2004). The tool was modified in 2004 to include chronic venous disorders. CEAP is a descriptive classification and can be used in conjunction with other venous severity scoring tools.

CEAP classification of chronic venous disease	Clinical classification
C0	No visible or palpable signs of venous disease
C1	Telangiectasies or reticular veins
C2	Varicose veins
C3	Oedema
C4a	Pigmentation or eczema
C4b	Lipodermatosclerosis or atrophie blanche
C5	Healed venous ulcer
C6	Active venous ulcer

Table 1: CEAP classification of venous disease (Eklof, 2004)

- Confirm the patient's specific requirements and reason for assessment
- Ask the patient if they have had any pain. This could be due to venous wall hypoxia, venous hypertension, venous wall tension, leucocyte adhesion in subvalvular areas or areas of inflammation (Clarke et al., 1992), heaviness which is due to increased capillary pressure and can result in oedema (Clarke et al., 1992), aching caused by oedema, night-time cramps and restless legs, swelling and itching of the lower limb. Symptoms may be typically worse at the end of the day and relieved by elevation (NICE, 2019).

- Consider risk factors such as immobility or a history of DVT
- Assess for any comorbidities. Common comorbidities encountered with venous disease are; diabetes mellitus, arterial hypertension peripheral arterial disease, heart failure, skeletal or joint leg diseases, renal insufficiency, emphysema or chronic constructive pulmonary disease, inflammatory bowel disease and malignant disease (Matic et al., 2014). Additional screening for these comorbidities in patients presenting with symptoms of venous disease is recommended (Matic et al., 2014).
- Ask the patient what current medication they are taking to complete full medical history.
- Consider where the person has any symptoms and if they affect overall quality of life and general health (NICE, 2019)
- Ask the patient if they have any allergies such as latex and lanolin – this may have an influence over choice of treatment.

Following full visual assessment nurses should consider a level one assessment of the venous system with a handheld continuous-wave Doppler for an ankle-brachial pressure index (ABPI) assessment (Ballard & Bergan, 2000). The ABPI assessment is not intended for diagnosis of venous disease but rather excludes significant arterial disease by comparing systolic blood pressure between the arm and ankle (Wounds UK, 2019). This procedure must be carried out by a competent the clinician who understands and is able to interpret results to confirm safe practice. The ABPI ratio is usually above 1. A value of below 0.92 is considered abnormal and an indication of peripheral arterial disease (Vowden & Vowden, 2018). Early intervention with class I or class II compression garments when C1 or C2 have been confirmed, significantly reduces further complications associated with venous disease.

Patients who are managed with compression should have regular vascular assessment to ensure arterial status has not worsened (Wounds UK, 2016).

Contraindications for doppler assessment (Wounds UK, 2019)
Deep Vein Thrombosis (DVT)
Cellulitis (depending on severity and pain)
Surgery to arm or leg
Lymph node clearance
Cancer related treatments
Amputation
Friable skin
Mental health related issues
Dementia
Neurological disease (e.g. that may affected the patients ability to sit still)

Before carrying out an assessment it is essential to correctly assemble all the necessary equipment.

Equipment required

- Handheld Doppler
- Multiple size blood pressure cuffs (to accommodate different limb sizes
- Manual sphygmomanometer
- Doppler gel
- Clean film (to cover leg ulcers/wounds if present)

- Gloves and aprons
- Documentation

Procedure

- Confirm the patients identify, explain and discuss the full procedure and obtain consent
- Wash hands and put on aprons and gloves
- Lay the patient down. To record the best resting ABPI the patient should be asked to remain as still as possible for 30 minutes (Whayman, 2014. This is a crucial part of the assessment and should not be rushed (Moffatt et al., 2007)

- The patient will need to lie as flat as possible to reduce hydrostatic pressure inaccuracies which can lead to falsely high ABPI readings. If the patient is unable to lie flat, try to bring the legs as close to heart level as possible. Document the position of the patient to ensure consistency for future readings.

- Observe the lower limb for previous leg ulcer scar and ask the patient of venous history. Check whether the patient has had any surgery for varicose veins involving ligation (tying off) and stripping (removal), Endothermal ablation (energy from high-frequency waves or lasers to seal the affected veins) (NICE, 2013)
- Observe the lower limb for signs of telangiectasis (spider veins) these are commonly found on the back of the leg. Telangiectasies or reticular veins: Telangiectasias, or spider veins, are small superficial veins or arterioles. Spider veins measure less than

1.0 mm in diameter and occur primarily in the lower extremities. Reticular veins are located in the subcutaneous tissue, they measure less than 3 mm in diameter and are often tortuous (twisted) and widened (Nakano *et al*., 2017).

- Check for visible, palpable varicose veins larger than 3mm. These are the most significant indicator of venous insufficiency. It is important to explain to patients that once chronic venous disease begins the delivery of nutrients and oxygen to the skin is being compromised and complications can easily develop.

  Assess lower limb for swelling, oedema and lymphorrhea (lymphatic leak). Pitting oedema is the result of applied pressure over oedematous subcutaneous tissue. Which results in a depressed area caused by displaced interstitial fluid and typically worsens throughout the day (Brodovicz et al., 2009). This can be assessed by firmly pressing your thumb onto the skin for at least two seconds on each limb.

- Observe the limb for any skin changes;

  Lipodermatosclerosis: defined as areas of painful, tight skin with hardened subcutaneous tissue just above the ankle (NICE, 2019). This is due to infiltration of fibrin and inflammation and results in an altered limb shape resembling an inverted champagne bottle.

  Hyperpigmentation: is identified by a reddish-brown discolouration of the skin due to the deposition of haemosiderin.

  Varicous excema: itchy, red, flaky and scaly skin which may blister with surface crusts (NICE, 2019)

Atrophie Blanche: white, star-shaped scared areas with surrounding pigmentation (NICE, 2019)

- Examine the foot locating the dorsalis pedis, anterior tibial, peroneal and posterior tibial pulses. Palpate foot pulses. Reduced or absent pulses may indicate Peripheral arterial disease (Londero *et al.,* 2016). It is important to note that 10% of the population have an absent dorsalis pedis. Editor, please add picture of a foot indicating pedial pulses.

- Measure brachial systolic blood pressure in both arms (unless contraindicated). This is the fundamental principle underpinning ABPI calculation and supports identification and management of a number of medical conditions (Vowden & Vowden, 2019)

- Place appropriately sized cuff around the upper arm. It is essential to use the appropriate cuff size for the patient's ankle. A cuff that is too small can result in an overestimation of pressure, a cuff that is too big can lead to an underestimation of pressure (Vowden & Vowden, 2018). Try to avoid repeatedly inflating the cuff before it has fully deflated as this can alter pressures (Whayman, 2007).

- Locate the brachial pulse and apply ultrasound gel.

- Hold the Doppler probe at 45 degrees to the arm in the direction of the heart. Move the probe around until a pulse is located. If a continual 'Whoosh' sound is heard, this is a vein and should not be used to calculate the ABPI (Whayman, 2014).

- Slowly inflate the cuff until the signal is no longer heard. Slowly deflate the cuff and record the pressure when the signal returns. Avoid rapidly deflating the cuff. This may result in the highest pressure being missed (Vowden & Vowden, 2018)

- Repeat this procedure on the other arm

- Place appropriately sized cuff around the ankle just above the malleoli. If required and for infection control purposes, cover leg ulcers or other wounds with clean film before the application of the blood pressure cuff.

- Apply ultrasound gel to the foot pulses and continue as for brachial pressure, recording in the same way. A minimum of two pulses should be used for each leg to calculate an ABPI. The Anterior tibial and Dorsalis pedis should not both be used in the same assessment as they form part of the same artery.

- Listen to the Doppler sounds to assess the level of arterial disease. A Triphasic sound is the sound of a healthy artery where 3 beats are heard. Biphasic sound is where two beats are heard, often in older patients who have altered physiology due to the normal ageing process. Monophasic or single beat heard indicates that vessel is diseased. It is important that nurses have good knowledge of the anatomy of the four foot pulses and arterial sounds to comprehend the state of the vessel (Whayman, 2014).

- Repeat for the other leg.

- To calculate an ABPI the highest reading on the right foot should be divided by the highest Systolic brachial. This should be repeated with the left foot, taking the highest reading on the left foot and dividing by the highest systolic brachial reading. This gives ABPI for the arterial vessels in both legs (Staines, 2018).

ABPI (Right) ≠ P®/P(B) ABPI (Left)≠ P(L)/P(B)

P® = Highest systolic pressure obtained from the vessels in the right ankle

P(L) = Highest systolic pressure obtained from the vessels in the left ankle

P(B) = Highest of the two brachial pressures

(From Vowden and Vowden, 2001b)

- Refer to local policy for interpretation of the ABPI values (NICE, 2019)

- Document the assessment in the patients' records

- Give the patient lifestyle advice to relieve symptoms of CVI and reduce risk factors. This should include advice around weight (obesity predisposes individuals to venous stasis – slow blood flow in the veins which can trigger DVT and CVI) (Willenberg, 2010). Engage in moderate physical activity including calf muscle pump exercises (NICE, 2013; Padberg, Johnston, Sisto, 2004) and avoid activities which require sitting or standing for prolonged periods of time (NICE, 2013). Advise the patient to elevate legs when sitting to improve blood flow back to the heart. As well as establishing safe practice of compression. ABPI assessment can confirm peripheral

arterial disease which can trigger appropriate referrals and treatment (Wounds UK, 2019).

In summary, the most common cause of CVI is venous reflux. Early assessment diagnosis and intervention can reduce complications of CVI and prevent further deterioration which can lead to leg ulceration. Nurses should be competent in recognising early signs of venous disease and provide patients with information to relieve symptoms and reduce risk factors.

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