

A review of the stages of venous insufficiency and clinical decision-making: a functional perspective for PT, OT and non-vascular clinicians

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Key words

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Abstract

Chronic venous insufficiency (CVI) is a common issue in our ageing population that can lead to a variety of skin changes, pain, oedema, and venous ulceration. The underlying causes of venous insufficiency are well understood, and there is a variety of well-established research and diagnostic tools, such as duplex ultrasound and the CEAP classification system. However, the clinic timing and method of treatment intervention from the non-vascular clinician standpoint can often be a challenge. This review provides a functional perspective for non-vascular clinicians to better understand CVI with early recognition, conservative management and early referral. Treatment emphasis will be placed on patient education, skincare, compression therapy, mobility, and outlining indicators for vascular referral.

Chronic venous insufficiency happens when the veins in the legs struggle to send blood back to the heart (Rai, 2014; Kim et al, 2021). Normally, the valves in these veins ensure that blood moves toward the heart. However, if these valves don't function properly, blood may flow backwards, leading to a buildup (or pooling) in the legs (Eklöf et al, 2004; Lurie et al, 2020; Kim et al, 2021). Statistics have shown that 1 in 3 adults have varicose veins and 1 in 50 adults with varicose veins will go on to develop chronic venous insufficiency (Kim et al, 2021). Chronic venous insufficiency affects 1 in 20 adults, typically over the age of 50 (Kim et al, 2021).

Diagnosis

Proper diagnosis of chronic venous insufficiency is imperative for early detection and intervention. A thorough examination should be completed, including physical exam, review of past medical history and the use of screening tools, such as duplex ultrasonography, venography, ambulatory venous pressure measurement, plethysmography and cross-sectional imaging (Rai, 2014). Symptoms of chronic

venous insufficiency can include swelling in the ankles and lower legs, a dull ache, cramping or heaviness in the legs, varicose veins, skin changes, thrombophlebitis and restless leg syndrome (Rai, 2014; Eklöf et al, 2004). Common skin changes associated with chronic venous insufficiency can include varicose veins, spider veins/telangiectasia, medial ankle flare (spider veins at medial ankle/foot), hemosiderin staining, atrophie blanche (white patches of scar tissue with red dilated capillary loops), shiny and taut skin, brawny or leathery skin, venous rubor (chronic inflammation), lipodermatosclerosis (fibrosis replaces the adipose layer at the ankle), livedo reticularis (mottled discolouration), stasis dermatitis (red/scaly/crusty/cracked/oozy/itching skin), recurrent cellulitis and ulceration (Eklöf et al, 2004; Rai, 2014).

CEAP classifications

Stages of venous disease are represented by the CEAP classification system. This system is represented with stages 0-6, with 0 being the least of the disease states [Table 1] (Lurie et al, 2020; Eklöf et al, 2004).

The C in CEAP stands for 'clinical signs'.

This includes the 6 grades, supplemented by (S) for symptomatic or (A) for asymptomatic presentation (Lurie et al, 2020; Eklöf et al, 2004). An example is C3A: symptoms include pain, aching, tightness, skin irritation, heaviness, muscle cramps or other complaints due to venous insufficiency (Rai, 2014; Lurie et al, 2020). The E in CEAP stands for 'etiologic factors' (Eklöf et al, 2004; Lurie et al, 2020). These include congenital (Ec), primary (Ep), secondary (Es; post-thrombotic), secondary intravenous (Esi), secondary extravenous (Ese) and no venous cause identified (En) (Eklöf et al, 2004; Lurie et al, 2020). The A in CEAP stands for 'anatomic distribution' (Eklöf et al, 2004; Lurie et al, 2020). These include superficial veins (As), perforator veins (Ap), deep veins (Ad), and no venous location identified (An; Eklöf et al, 2004; Lurie et al, 2020). The numbering classification in the anatomic classification has now been replaced with easier to use abbreviations for advanced CEAP (Lurie et al, 2020). The P in CEAP stands for 'pathophysiologic dysfunction' (Eklöf et al, 2004; Harding et al, 2015). This includes reflux (Pr), obstruction (Po), reflux

Table 1. CEAP Classification System definitions.	
Class	Definition
C0	No visible or palpable signs of venous disease
C1	Telangiectasis or reticular veins
C2	Telangiectasis or reticular veins
C3	Varicose veins distinguished from reticular veins by a diameter of 3mm or more
C4	Changes in skin and subcutaneous tissue secondary to chronic venous disease, divided into 3 subclasses to better define the differing severity of venous disease: • C4a: pigmentation or eczema • C4b: lipodermatosclerosis or atrophie blanche • C4c: corona phlebectatica
C5	Healed venous ulcer
C6	Active venous ulcer

and obstruction (Pr,o), and no venous pathophysiology identifiable (Pn) (Eklöf et al, 2004; Lurie et al, 2020).

Case example

A 62-year-old male with a BMI of 30 and controlled diabetes presented with achiness and heaviness in his legs that had been present for 2 years and become progressively worse. The patient had no surgical history that would affect his legs. The patient had mild hemosiderin staining distal lower legs (right greater than left) with mild oedema. The patient explained that his father and grandfather’s legs looked very similar. Following evaluation

with duplex ultrasonography, the patient was found to have congenital venous insufficiency of the perforating vessels with reflux and obstruction. This patient’s CEAP level was C_{4a}S_cE_cA_cP.

Treatment with compression

At what level at CEAP do we begin compression? Compression initiated at CEAP stage 1-2 can significantly lessen the risk of further disease process (Rai, 2014). The effects of compression can include improved venous and lymphatic return, reduction of inflammatory mediators, increased immune response, and improved arterial flow (Rai, 2014). At CEAP stage

1-2 it is best to initiate daily circular knit compression garments in grade 15-20mmHg or 20-30mmHg (Rai, 2014). At CEAP stage 3, 4 and 5, we need to increase the compression level with the use of stiffer circular knit or flat-knit garments in grade 20-30mmHg or 30-40mmHg, inelastic wraps and multi-layer short-stretch bandaging systems (Rai, 2014). Some patients may utilise only one of these products, whereas patients with a higher CEAP stage may use a combination of these compression products. At CEAP stage 6, the same compression combinations will be used as with stage 3-5; however, at this stage, wound care must also be initiated for management of venous leg ulcers(VLUs; Rai, 2014; Harding et al, 2015). Referral to a vascular surgeon is recommended for CEAP level 3 through 6 patients (Rai, 2014; Harding et al, 2015).

Compression is the gold standard for the treatment of VLUs (Rai, 2014). Compression reduces the risk of recurrence once VLUs are healed and is the standard therapy for the oedema associated with VLUs and/or lymphoedema (Rai, 2014). Compression also increases healing rates as compared to treatment without compression and supports venous blood flow to the heart (Rai,2014). To ensure that it is safe to compress a patient’s legs, it is important to obtain an ankle brachial index



CEAP Stage 1 presentation.



CEAP Stage 2 presentation.



CEAP Stage 3 presentation.



CEAP Stage 4a presentation (pigmentation).



CEAP Stage 4b presentation (lipodermatosclerosis).



CEAP Stage 5 presentation.



CEAP Stage 6 presentation.

Table 3. Think of It Like A Grade = A & B's good to go! C & D use caution. F = No!

> 1.4 Calcified vessels (common in patients with diabetes), refer to Vascular, need a Toe ABI
1.0-1.4 = Safe to use all compression, good healing potential
90-100% is an A = safe to use all levels of compression and debride
80-89% is a B = Still safe to apply all compression and debride, but monitor
Less than 80% = limited healing potential, refer to Vascular Can still gently debride, light compression
< 50% = SEVERE PAD, don't compress (could compress whatever circulation patient has). Urgent Vascular consult.
< 0.4 = Critical limb ischemia

Table 4. Ankle Brachial Index (ABI) interpretation.

> 1.4 = Falsely Elevated
1.0-1.4 = Normal
0.91-0.99 = Borderline PAD
0.8-0.90 = Mild PAD, LEAD
0.51-0.79 = Moderate PAD
< or = 0.5 = Severe PAD

(ABI) measurement to ensure there is good perfusion to the legs (Rai, 2014; Rasmussen et al, 2016) [See Tables 3 and 4].

In addition to the use of compression, there are a few lifestyle changes that can assist with reducing the risk of furthering the progression of venous disorders. Have patients walk as much as they are able using a heel-toe action and avoid standing in one place (Rai, 2014). Patients need to moisturise the skin on the legs and feet (avoiding applying moisturiser to open wounds or between the toes), and when sitting patients need to keep the legs elevated with the ideal being above heart level (Rai, 2014). Once VLUs have healed, the continued use of compression garments worn daily will help to prevent further VLUs (Rai, 2014).

Conclusion

As a healthcare clinician, having a thorough understanding of the signs, symptoms and stages of venous insufficiency is essential in managing and potentially halting the progression of this condition. By recognising the early warning signs, practitioners can take proactive steps to slow down the disease's advancement. Additionally, understanding the appropriate use of various types of compression therapy at the right stages can play a crucial role in managing venous insufficiency. Proper compression not only helps to prevent further progression of the disease but also significantly reduces the risk of complications, such as VLUs, improving patient outcomes.

References

- Eklöf B, Rutherford RB, Bergan JJ et al (2004) Revision of the CEAP classification for chronic venous disorders: consensus statement. *Journal of Vascular Surgery* 40: 1248–52
- Harding K, Dowsett C, Fias L et al (2015) *Simplifying Venous Leg Ulcer Management: Consensus Recommendations*. London: Wounds International
- Kim CYY, Png M, Sumpio BJ et al (2021) Defining the human and health care costs of chronic venous insufficiency. *Seminars in Vascular Surgery* 34(1): 59–64
- Lurie F, Passman M, Meisner M et al (2020) The 2020 update of the CEAP classification system and reporting standards. *J Vasc Surg Venous Lymphat Disord* 8(3): 342–52
- Rai R (2014) Standard guidelines for management of venous leg ulcer. *Indian Dermatology Online Journal* 5(3): 408–11
- Rasmussen JC, Aldrich MB, Tan IC et al (2016) Lymphatic transport in patients with chronic venous insufficiency and venous leg ulcers following sequential pneumatic compression. *J Vasc Surg Venous Lymphat Disord* 4(1): 9–17