

CONSENSUS

UIP 2011 C3 consensus

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In the CEAP classification C3 represents venous edema which is to be differentiated from lymphedema and lipedema. C3 is situated between varicose veins (C2) which is non-complicated disease and C4

The diagnosis of C3 may be relatively easy on clinical examination but to confirm the venous etiology appropriate investigations must be performed. Before treatment is undertaken a measurement or an estimate of the edema should be recorded and compared to the same measurements following treatment to appreciate treatment efficacy.

Definition of a venous edema

“Perceptible increase in volume of fluid in skin and subcutaneous tissue characteristically indented with pressure. Venous edema should be attributed to a venous etiology”.¹⁻³

Diagnosis

The Diagnosis of Edema is mainly clinical.

Clinical diagnosis

Venous edema is characterized by the following:

1) Edema in chronic venous disease (CVD) is characterized by the following:

- increase in volume of one or both lower legs;
- most commonly involving the lower legs, ankle or malleolar area, less often the foot itself;

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- skin frequently displays a whitish discoloration from being stretched (by the extra fluid);
- it is exacerbated:^{4,5}
 - by long periods of standing or sitting;
 - in a warm environment;
- it is improved:
 - in a cold environment;
 - by prolonged supine position or elevation *e.g.* sleeping supine.
- it is detected visually and by applying gentle and prolonged pressure with the thumb, on the medial surface of the tibia, for example. Indentation of the skin (pitting) by this finger (or by socks or shoes) is characteristic (Figure 1A, B);
 - in case of long-term venous edema this pitting sign is less apparent (like in some stages of lymphedema);⁵⁻⁷
 - its consistency may vary from soft to harder (indurated). This may represent venous edema coexistent with early lymphedema.
 - edema of the toes: The examiner should firmly pinch and release the dorsum of each toe to detect edema. A normal toe can be pinched without leaving a skinfold upon release. In progressively worsening cases of lymphatic edema a skin fold remains after pinching and in severe lymphedema no skin fold can be raised at all (Stemmer's Sign). This sign is not typically present in venous edema, except in severe cases where lymphedema may also be present (Figure 2A-C).
 - Severity of edema: In the Venous Clinical Severity Score (VCSS) of the CEAP classification venous edema is quoted as 1= None, 2= evening ankle edema only, 3= Afternoon edema above ankle, 4= morning edema above ankle and requiring activity change.^{2,8}

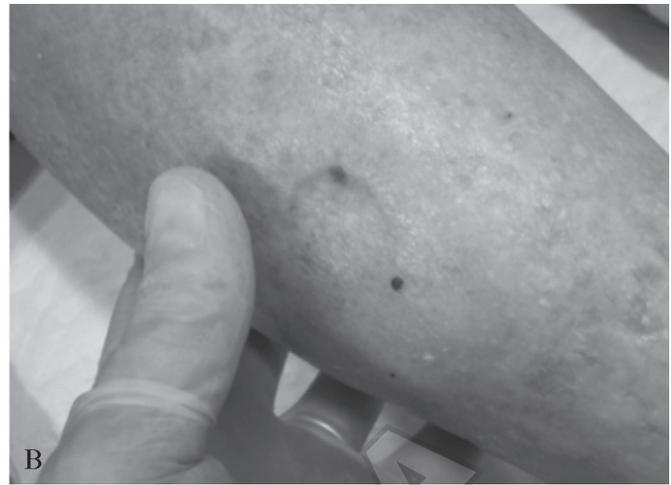


Figure 1.—A pitting sign example. A) During the gentle and prolonged pressure; B) indentation after having stopped the pressure.



Figure 2.—The Stemmer's sign. A) Before any pressure; B) during the prolonged pinch; C) A fold remains after pinching.

Acute venous edema may be due to acute venous disease such as deep or superficial vein thrombosis or other conditions like cellulitis, acute non-bacterial inflammation or ruptured Baker's cyst. Note that decompensation of CVD may also lead to acute or subacute swelling of the leg.

Differential diagnosis of chronic leg edema

Chronic leg edema may be due to causes other than venous, such as: lymphedema, inflammation, cardiac, renal, thyroid or hepatic diseases and/or in skin atrophy, inactivity or limb paralysis or dependency, protein deficiency, some antihypertensive agents, etc.^{3, 5, 7} In order to diagnose venous edema (C3) it is necessary to eliminate other causes. Medical history and physical examination are manda-

tory. Additional investigations may be necessary.

Several standardized questions may be helpful to evaluate the cause of the leg edema:

- Is it unilateral or bilateral?
- Did it arise rapidly, or did it progress slowly?
- Did it begin in the toes, the ankle or the calf?
- What medications does the patient take?
- Has the patient recently taken a long-haul flight or road travel?^{3-5, 8, 9}

NOTE: Combinations of venous and other causes for the leg edema are possible

Diagnosis of CVD should be applicable

This consensus on C3 does not intend to repeat the extensive information found in other

relevant UIP consensus documents on investigations and treatments available for venous disease. This consensus is to be read in conjunction with them.

A precise diagnosis is the basis for correct classification of the venous problem. A way to organize the diagnostic evaluation of the patient with CVD is to utilize one or more of three levels of testing, depending on the severity of the disease:^{2, 8}

Level I: The office visit with history and clinical examination, which may include use of a 'pocket' or handheld Doppler with an auditory signal component.

Level II: The non-invasive vascular laboratory with duplex ultrasound imaging and color flow scanning, with or without plethysmography.

Level III: The addition of invasive investigations or complex imaging studies including ascending and descending phlebography, varicography, venous pressure measurements, CT scan, venous helical scan, MRI or IVUS.

This may be modified according to clinical circumstances and local practice:

Level II: Investigations will often determine whether or not reflux or obstruction in the superficial and/or deep veins is contributing to the edema. If obstruction is demonstrated or suspected as a result of duplex scanning.

Level III: Studies to investigate the deep venous system should be considered.

GENERAL REMARKS CONCERNING THE DIAGNOSIS OF CVD

There is no single test that can provide all information needed to make clinical decisions and plan a management strategy. Understanding the pathophysiology is the key to selecting the appropriate investigations.

When a patient presents with symptoms and signs suggestive of CVD, a physician should ask a number of clinically relevant questions. The first question is to ask whether CVD is present. If it is, then investigations should follow that determine the presence or absence of reflux, obstruction, calf muscle pump dysfunction and the severity of each.^{10, 11}

When a venous etiology is uncertain, *Lymphoscintigraphy* may be indicated to distinguish

the presence of lymphedema which may also be present in certain patients.

Quantification of edema and leg volume

The quantification (measurement) of edema is not easy to perform but may be done by perimetry, water displacement volumetry, optic-electronic volumetry by the Perometer, image 3D, Body scan, plethysmography, Bio-impedance of the leg.^{10, 11}

Perimetry is the easiest method to measure the amount and extent of an edema. It is done by measuring the leg circumference at different levels with a centimeter' tape: For example at the narrowest part of the ankle, at the widest part of the calf, etc.

Each measurement is recorded in order to quantify and compare the effectiveness of treatment.¹²

Water displacement volumetry is considered the best method to compare the extent of edema at different times. Volumetry does not quantify edema, but measures short-term variations which reflect changes in edema. It is reproducible provided measurement conditions are carefully standardized.^{13, 14}

Volumetry allows accurate comparison of changes in the same leg over time or with changing conditions as displayed by different amounts of edema, e.g. morning *versus* evening, lying down or standing, resting or after exercise, before and after the application of a venous tourniquet, before and after treatment and at the beginning compared with the end of the follow-up period.

Optoelectronic volumetry by Perometer is a good method to assess leg volume changes at a single time point and over a 3 weeks' time period.

However, volumetry results are biased by orthostatic and daytime-related volume changes. The bias for day-time related volume changes can be minimized by a time-correction formula.^{15, 16}

Method of IMAGE 3D for measuring lower leg volumes correlates well with the results of water plethysmography. The length of the lower leg seems to be the pivotal influencing factor.¹⁷

Ultrasound has been demonstrated to be of value in distinguishing between C3 venous ede-

ma and edemas of non-venous origin (such as lymphedema, lipodystrophy and other kinds of edema). It could be utilized also to evaluate the effectiveness of treatment.^{10, 11}

Therapy

Postural drainage

This is to be recommended to the patient (above all with edema) and is achieved by placing his bed in the Trendelenburg position, tilted foot up, head down, avoiding cushions, pillows or blankets under their foot or calf.

Elevation of the lower extremity is of greater benefit and may be encouraged during the day but sitting and elevating the leg on a poof of stool is useless and splints all muscle movements. The best position is bed rest.^{1, 3, 7}

Compression therapy

Therapy that applies pressure to the lower extremities is a fundamental component for managing CVD.^{1, 3, 11, 18-21}

BANDAGES

Long stretch bandages extend by more than 100% of their original length, short-stretch bandages extend to less than 100%. Stiff bandages such as the zinc plaster bandage (Unna's boot) and auto adhesive devices do not extend at all.¹⁹

MEDICAL COMPRESSION STOCKINGS

Medical compression stockings (MCS) are made of elasticized textile. According to their length, they are classified as knee-length, thigh-length and tights (panty style). They may be custom-made or off the shelf and are available in standard sizes.

Different compression classes are available: 10 mmHg to 20 mmHg, 20 mmHg to 30 mmHg, 30 mmHg to 40 mmHg and more than 40 mmHg.^{19, 20} According to many publications 30 mmHg MCS is mainly sufficient to reduce signs like C3, C4, C5 and C6.²¹

Most patients can apply easily a MCS below 30 mmHg. Above this pressure it is recommended to decompose the MCS in two: Instead of one 40

mmHg MCS two 20 mmHg MCS can be used, instead of one 50 mmHg MCS, one 15 mmHg plus 35 MCS can be used.^{22, 23}

Generally different levels of compression can be characterized as light compression (10-14 mmHg), mild compression (15-21 mmHg) moderate compression (23-32 mmHg), strong compression (34-46 mmHg) and very strong compression (>49 mmHg).

Some countries describe increments in stocking pressure by 10 mmHg : <10 mmHg, 10-20 mmHg, 20-30 mmHg, 30-40 mmHg, 40-50 mmHg which is easier to use and remember.

In order to measure what pressure is being applied to the patient's leg once the edema has been initially reduced, the interface pressure beneath the stocking can be measured using specific devices.²⁴

HOW TO USE MEDICAL COMPRESSION

Often the first step in treatment is to reduce the edema by applying one or more bandages to the leg. Following reduction in the edema, a graduated elastic stocking is applied.^{19, 23, 24}

Alternatively stockings may be used from the beginning of treatment.²² A recent publication has shown that treating leg edema using a 30 mmHg stocking demonstrated a positive correlation between pressure exerted and volume reduction. To achieve a similar result using bandages an initial resting bandage pressure of 60 mmHg was required.²⁵

INTERMITTENT PNEUMATIC COMPRESSION DEVICES

Intermittent pneumatic compression (IPC) devices consist of single or preferably multiple inelastic cuffs that are intermittently and/or sequentially inflated. Limited data based on randomized controlled studies are currently available demonstrating encouraging clinical outcome when IPC is used as part of the care for venous ulcers (C6).²¹

Drugs

VENOACTIVE DRUGS

Venoactive drugs (VADs) are a heterogenic group of drugs from vegetable or synthetic origin.³

Numerous randomized controlled double blind studies have demonstrated the anti-edematous effect and effective attenuation of symptoms of CVD such as heavy legs, pain and restless legs by VADs so that they have become an established component of the therapeutic armamentarium for all stages of disease. VADs may accentuate the effects of compression on symptoms and some of them accelerate and healing of leg ulcers.

THERAPEUTIC EFFICACY OF ORAL VADS ON C3

Several well-conducted, controlled trials *versus* placebo or stockings have shown efficacy of oral VADs such as micronized purified flavonoid fraction, rutosides, horse chestnut seed extract, calcium dobesilate, proanthocyanidines, and coumarin associated to rutin.

In these trials, evaluation of the antiedema efficacy was based on objective measures such as leg circumference assessment, strain-gauge plethysmography and water displacement. Results of meta-analyses have confirmed the anti-edema efficacy of such medications.²⁶

TOPICAL TREATMENT

VADs and heparinoids are blended in topical preparations. The formulation, especially in gels, has a relieving effect on some symptoms. Natural heparin and heparinoids have anti-inflammatory properties, an analgesic effect by inactivating histamine, and anti-thrombotic effects. The transcutaneous effectiveness of VADs and heparinoids depends on their concentration. Several brands are associated with other active substances such as polidocanol and local anesthetic agent.

Electromuscular stimulation

This treatment method is designed to activate the calf muscle pump. Clinical trials have demonstrated that it is a well-tolerated and effective method of treatment for venous edema, and also may relieve the symptoms of CVI.²⁷

Sclerotherapy and surgery

As C3 is a consequence of CVD, once an underlying venous etiology is identified, appropriate

treatments for the condition are useful. When varicose veins have to be treated but it doesn't mean that the edema will disappear forever. It is the same with deep venous surgery and other treatment methods.

All the available treatments have already been discussed. We do not want to repeat discussion about what the available treatments are for venous insufficiency, as these are in another consensus document.²⁸

Conclusions

C3 or venous edema is one of the most important signs of chronic venous disease. It may appear before any of the other manifestations.

The diagnosis is clinical. To confirm the venous origin of the edema additional investigations such as duplex ultrasound are required.

The treatment varies widely from postural drainage to deep venous surgery, according to the etiology. Graduated compression should be considered as a most important method of treatment, to be commenced soon after diagnosis and encouraged long term as maintenance therapy.

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