Kliiniline küsimus nr 3

Kas kõikidel kroonilise venoosse haavandi kahtlusega patsientidel teostada lisaks anamneesile ja vaatlusele järgmised uuringud vs mitte:
- labajala pulsi katsumine
- ABPI/ABI (Ankle Brachial Pressure Index/Ankle Brachial Index) ja/või TBI (Toe Brachial Index)
- dopplersonograafia vs flebograafia (tavaline röntgen, kompuutertomograafia, magnetresonantstomograafia)

Kriitilised tulemusnäitajad: Tulemusnäitajad: ravi tulemuslikkus, haavandi paranemine, patsiendi elukvaliteet, uuringumeetodi tundlikkus, elulemus, üldsuremuse vähenemine, ravikulu

Süstemaatilised ülevaated
ABPI/ABI määramine venoosse haavandi kahtlusega pt-l
Puuduvad sellised süstemaatilised ülevõtted mis konkreetselt uuriks ABI kasutamist kroonilise venoosse haavandiga haigel. On ülevaatlikke artikleid ABI rolli kohta PAD diagnostikas.

1) Numerous studies have reported that the ABI, when compared to angiography, has a sensitivity of more than 90% and a specificity of more than 95% in diagnosing 50% stenosis of the lower extremity arteries [6,11,12,16,17,25,26]. However, Schroder et al. recently reported that the HAP ABI had a sensitivity of 68% and a specificity of 99% [27]. The authors reported the LAP ABI sensitivity and specificity to be 89 and 93% respectively. Niazi et al. reported that the HAP ABI had a sensitivity of 69% with a specificity of 83%. The sensitivity and specificity of the LAP ABI was 84% and 64% respectively [28]. Feigelson et al. [29] evaluated the sensitivity of an ABI < 0.8 to be 39 % within the entire cohort and 70% in patients with PAD (This study is reported by ACC/AHA guidelines that ABI has a sensitivity of 89% in diagnosing PAD). Lijmer et al. has reported that an ABI value of 0.91 had a sensitivity of 79% and a specificity of 96% to detect 50% or more stenosis of lower extremity arteries defined on angiography.

Allikas: Khan TH, Farooqui FA, Niazi K. Critical Review of the Ankle Brachial Index.*Current Cardiology Reviews*. 2008;4(2):101-106. doi:10.2174/157340308784245810.

2) Recommendations for the Use and Interpretation of the ABI in Case of Clinical Presentation of Lower-Extremity PAD 1. In the case of clinical suspicion based on symptoms and clinical findings, the ABI should be used as the first-line noninvasive test for the diagnosis of PAD (Class I; Level of Evidence A).11,38,41,50,56 2.
An ABI 0.90 but there is clinical suspicion of PAD, postexercise ABI or other noninvasive tests, which may include imaging, should be used (Class I; Level of Evidence A).40,58,60,212 4.
It is reasonable to consider a postexercise ankle pressure decrease of >30 mm Hg or a postexercise ABI decrease of >20% as a diagnostic criterion for PAD (Class IIa; Level of Evidence A).40,60,62 5.
American Heart Association
Aboyans V, Criqui MH, Abraham P, Allison MA, Creager MA, Diehm C, Fowkes FGR, Hiatt WR, Jo¨nsson B, Lacroix P, Marin B, McDermott MM, Norgren L, Pande RL, Preux P-M, Stoffers HE, Treat-Jacobson D, on behalf of the American Heart Association Council on

Peripheral Vascular Disease, Council on Epidemiology and Prevention, Council on Clinical Cardiology, Council on Cardiovascular Nursing, Council on Cardiovascular Radiology and Intervention, and Council on Cardiovascular Surgery and Anesthesia. Measurement and interpretation of the ankle-brachial index: a scientific statement from the American Heart Association. Circulation. 2012;126:
Kättesaadav:
http://circ.ahajournals.org/content/early/2012/11/15/CIR.0b013e318276fbcb.full.pdf

Mõned uuringud ABI kohta

a) Pulss vs ABI: on vaja ka ABI määrata
Palpeeriti aDP pulssi, mõõdeti ABI. Grupis, kel pulss ei olnud palpeeritav, oli 39.8% ABI üle 0,9. Grupis palpeeritava pulsiga oli 15,4% ABI 0,9 või alla selle. Uuringus 665 pt, kellest lõpuks kaasatud 173+337=510.

Does Dorsal Pedal Pulse Palpation Predict Hand-Held Doppler Measurement of Ankle-Brachial Index in Leg Ulcer Patients? 2003a

Kättesaadav: http://www.woundsresearch.com/article/1800

b) Uuring, kus pulssi katsuti ja ABI määrati skriinimise eesmärgil 403 haigel. Neist 67-l PAD. 45 haigel, kel vasem jalg problemaatiline, 37-l palpeeritav pulss (82,2%). 37-l, kel parem jalg kaebuseks, 25 pulss (67,6%).

We enrolled 403 patients with a mean age of 63.8 +/- .36 years. The prevalence of PAD was 16.6% (67 patients total). Of the 45 patients with disease involving their left leg, 37 (82.2%) had a palpable pulse. Of the 37 patients with disease involving their right leg, 25 (67.6%) had a palpable pulse. The sensitivity of a non-detectable pulse for the diagnosis of PAD was 17.8% and 32.4% for the left leg and the right leg, respectively. The specificity of pulse palpation for the detection of PAD was 98.7% and 97.8% for the left leg and the right leg, respectively.
Pulse palpation is not sensitive for the detection of PAD compared to ABI. More than two thirds of the patients within our cohort with PAD of either the left or right leg had a detectable pulse.

Collins TC, Suarez-Almazor M, Peterson NJ. An absent pulse is not sensitive
for the early detection of peripheral arterial disease. Fam Med. 2006
Jan;38(1):38-42. PubMed PMID: 16378257.

http://www.ncbi.nlm.nih.gov/pubmed/16378257

c) Twenty-four GPs enrolled 10 consecutive patients each, at intermediate cardiovascular risk, based on age >55 and <65 years and one or two associated major cardiovascular risk factors or age >65 and <80 years without associated cardiovascular risk factor. Clinical data recording and measurements of the ABI were performed. The design of the study was a prospective, blind comparison between the ABI measured by palpation by the GP and simultaneously by Doppler ultrasound by an angiologist (reference test).

RESULTS: Out of 240 enrolled patients, 205 completed the study (35 lost to follow-up); in 9, ABI by palpation was not measurable. Out of the remaining 196 assessable patients, 8 (4.08%) had PAD. Sensitivity of the palpation method was 88% (95% confidence intervals: 65-100), specificity 82% (77-88), positive predictive value 18% (6-29), negative predictive value 99% (98-100), positive likelihood ratio = 4.98 (3.32-7.48) and negative likelihood ratio = 0.15 (0.02-0.95).

CONCLUSIONS:

The measurement of ABI by palpation in the setting of primary care, in patients at intermediate cardiovascular risk, is a sufficiently sensitive method to consider its use as a screening test for the exclusion of PAD

The possible substantial reduction of costs for the Health Care System is an argument in favor of a generalized screening of PAD in primary care, a procedure recommended by several authorities.7,8 The low cost and the inexpensive equipment required for the screening of ABI by palpation may be of particular importance for developing countries where the prevalence of atherosclerotic disease is in great expansion.15 The cost–benefit ratio of an alternative strategy, i.e. that of providing all GPs with the appropriate equipment and the training for ABI measurements by Doppler Ultrasound, is likely to be disadvantageous.

Ankle-brachial index measured by palpation for the diagnosis of peripheral arterial disease.

Migliacci R, Nasorri R, Ricciarini P, Gresele P.

Fam Pract. 2008 Aug;25(4):228-32. doi: 10.1093/fampra/cmn035. Epub 2008 Jun 20.

TBI/TBPI määramine

a) When the ABI is >1.40 but there is clinical suspicion of PAD, a toe-brachial index or other noninvasive tests, which may include imaging, should be used (Class I; Level of Evidence A).65,66

American Heart Association

b) Peripheral arterial disease (PAD) can be diagnosed noninvasively by segmental blood pressure measurement and calculating anankle-brachial index (ABI) or toe-brachial index (TBI). The ABI is known to be unreliable in patients with vascular stiffness and fails to detect the early phase of arteriosclerotic development. The toe vessels are less susceptible to vessel stiffness, which makes the TBI useful. However, the diagnostic limits used in guidelines, clinical settings, and experimental studies vary substantially. This review provides an overview of the evidence supporting the clinical use of the TBI.

METHODS: A review of the literature identified studies reporting the use of the TBI regarding guideline recommendations, normal populations, correlations to angiographic findings, and prognostic implications.

RESULTS: Eight studies conducted in a normal population were identified, of which only one study used imaging techniques to rule out arterial stenosis. A reference value of 0.71 was estimated as the lowest limit of normal based on the weighted average in studies with preheating of the limbs. A further seven studies showed correlations of the TBI with angiographic findings. The TBI had a sensitivity of 90% to 100% and a specificity of 65% to 100% for the detection of vessel stenosis. Few studies investigated the value of the TBI as a prognostic marker for cardiovascular mortality and morbidity, and no firm conclusions could be made. Studies have, however, shown correlation between the TBI and comorbidities such as kidney disease, diabetes, and microvasculature disease.

CONCLUSIONS: In contrast to the well-defined and evidence-based limits of the ABI, the diagnostic criteria for a pathologic TBI remain ambiguous. Although several guidelines and reviews of PAD diagnostics recommend a TBI <0.70 as cutoff, it is not strictly evidence-based. The current literature is not sufficient to conclude a specific cutoff as diagnostic for PAD. The current studies in normal populations and the correlation with angiography are sparse, and additional trials are needed to further validate the limits. Large-scale trials are needed to establish the risk of morbidity and mortality for the various diagnostic limits of the TBI.

J Vasc Surg. 2013 Jul;58(1):231-8. doi: 10.1016/j.jvs.2013.03.044. Epub 2013 May 18.

The toe-brachial index in the diagnosis of peripheral arterial disease.

Høyer C[1], Sandermann J, Petersen LJ.

c) However, because of the limitations of the ankle pressures related to the rigidity of the arterial walls of the tibial vessels and the more distal site of the measurement in the toes, measurements of pressure in the toes should be included in the evaluation of arterial disease in all patients with diabetes, and in all limbs with severe ischemia.

Int Angiol. 1992 Oct-Dec;11(4):289-97.

Ankle and toe systolic pressures comparison of value and limitations in arterial occlusive disease.

Carter SA[1].

d) Recently published national guidelines for assessment and management of patients with lower extremity wounds have recommended using noninvasive tests such as the ankle brachial index and toe brachial index to rule out lower extremity arterial disease, which complicates wound healing. However, the ankle brachial index can be falsely elevated in patients with diabetes and renal failure because of calcification of the arteries, which causes them to be incompressible. In these situations, it has been advised to obtain a toe pressure or toe brachial index because digital arteries are usually less affected by calcification.
J Wound Ostomy Continence Nurs. 2006 Jan-Feb;33(1):30-41.

Get the LEAD out: noninvasive assessment for lower extremity arterial disease using ankle brachial index andtoe brachial index measurements.

Bonham PA[1].

Ravijuhendid

Kokkuvõte ravijuhendites leiduvast

SVS_AVF 2014

Approximately 15% to 25% of patients with VLUs will have a concomitant PAD component.

Key components of the physical examination include measurement of blood pressure in both arms, cardiac auscultation, leg examination (changes in color, skin temperature, muscle atrophy, decreased hair growth, hypertrophied nails), and complete pulse examination (palpation for aneurysms; auscultation for bruits in carotid, aorta, or femoral region; palpation of the radial, ulnar, brachial, carotid, femoral, popliteal, dorsalis pedis, and posterior tibial artery pulse). *Lower extremity Doppler examination is standard for patients with suspected PAD.* Measurement of ankle-brachial index (ABI) is performed in the supine position with a sphygmomanometer cuff placed just above the ankle and a continuous-wave Doppler probe used to measure the systolic pressure of the posterior tibial and dorsalis pedis arteries of each leg, which is then normalized to the higher brachial pressure of either to calculate the ABI for each leg. ABI is calculated by dividing the systolic ankle pressure by systolic arm pressure. *The reproducibility of the ABI varies, but it is significant enough that reporting standards require a change of 0.15 in an isolated measurement for it to be considered clinically relevant or >0.10 if it is associated with a change in clinical status. The typical cutoff point for diagnosis of PAD is ABI #0.90 at rest, with ABI #0.50 usually corresponding to critical limb ischemia. In patients with diabetes, renal insufficiency, or other diseases that cause vascular calcification, tibial vessels at the ankle become noncompressible, leading to a false elevation of the ankle pressure and ABI. In these patients, additional noninvasive diagnostic testing, such as pulse volume recordings or toe pressure measurement, should be performed to evaluate for PAD.*

Venous Duplex Ultrasound We recommend comprehensive venous duplex ultrasound examination of the lower extremity in all patients with suspected venous leg ulcer. [GRADE - 1 ; LEVEL OF EVIDENCE - B]

For a leg ulcer to be classified as a VLU, there needs to be objective documented evidence of venous disease. Ultrasound assessment needs to include evaluation for both obstructive and reflux patterns of venous disease.

Guideline 3.10: Venous Plethysmography We suggest selective use of venous plethysmography in the evaluation of patients with suspected venous leg ulcer if venous duplex ultrasound does not provide definitive diagnostic information. [GRADE - 2; LEVEL OF EVIDENCE - B]

Venous plethysmography (strain-gauge, air, or photoplethysmography) provides additional venous limb physiologic parameters regarding global venous reflux, outflow obstruction, and calf muscle pump function and has shown good correlation with venous duplex ultrasound.163-168 Some studies have shown utility for monitoring of venous functional changes and assessment of physiologic outcome of surgical treatments.169-172 However, current evidence does not support a primary role for venous plethysmography as a diagnostic test for venous disease above venous duplex ultrasound. Venous plethysmography should be reserved for equivocal findings of venous duplex ultrasound examination, for recalcitrant or

recurrent VLU, or if additional venous physiologic testing is required for diagnostic or therapeutic reasons

Guideline 3.11: Venous Imaging We suggest selective computed tomography venography, magnetic resonance venography, contrast venography, and/or intravascular ultrasound in patients with suspected venous leg ulceration if additional advanced venous diagnosis is required for thrombotic or nonthrombotic iliac vein obstruction or for operative planning before open or endovenous interventions. [GRADE - 2; LEVEL OF EVIDENCE - C]

SIGN

3.2.1 THE ANKLE BRACHIAL PRESSURE INDEX

Objective evidence to substantiate the presence or absence of significant peripheral arterial disease (PAD) may be obtained reliably (except in those with heavily calcified vessels) by obtaining an ankle brachial pressure index (ABPI) in both legs at the initial visit. This is the ratio of the ankle to brachial systolic pressure and can be measured using a sphygmomanometer and hand held Doppler device.24 Appropriate training is required due to the complexity of clinical reporting and methodological issues around interpretation and reproducibility of results.25

A resting ABPI cut-point of 0.9 has been shown in several clinical studies to be highly sensitive and specific for peripheral arterial disease (positive predictive value of 95% and negative predictive value of 99%), and, in practice, an ABPI of <0.9 is considered to be abnormal.26

An observational study of 24 healthy young adults highlighted a higher normal range for ABPI in young patients (mean ABPI=1.14). This may be of significance to the treatment of leg ulcers in young adults, such as intravenous drug users.27

A review concluded that compression therapy may be safely applied in patients with an ABPI greater than 0.8.23

Care must be taken in interpreting ABPI results in patients with heavily calcified vessels, such as in some patients with diabetes and advanced chronic renal failure, where they may be misleadingly high. For values above 1.5, the vessels are likely to be incompressible, and the result cannot be relied on to guide clinical decisions.24

D Measurement of ankle brachial pressure index should be performed by appropriately trained practitioners who should endeavour to maintain their skills.

D Compression therapy may be safely used in leg ulcer patients with ABPI≥0.8.

D Patients with an ABPI of <0.8 should be referred for a specialist vascular assessment. Patients with an abnormal ABPI should have their cardiovascular risk factors treated according to the SIGN guideline on management of peripheral arterial disease (SIGN 89).

3.2.2 PULSE OXIMETRY

One single centre open study of 195 legs showed that pulse oximetry may be a useful alternative technique for assessing peripheral arterial disease, with positive linear association and some agreement with ABPI measurement (kappa=0.303).28

There is insufficient evidence on which to base a recommendation for routine use of pulse

oximetry in patients with chronic venous leg ulcer.; Pulse oximetry is not routinely recommended, but may be a useful adjunctive investigative
tool in specialist leg ulcer clinics.

RNAO
LEVEL OF EVIDENCE A: Evidence obtained from at least one randomized controlled trial or
meta-analysis of randomized controlled trials.
LEVEL OF EVIDENCE B: Evidence from well designed clinical studies but no randomized controlled trials.
LEVEL OF EVIDENCE C: Evidence from expert committee reports or opinion and/or clinical
experience or respected authorities. Indicates absence of directly applicable studies of good quality.
Recommendation 1
Assessment and clinical investigations should be undertaken by healthcare professional(s) trained and experienced in leg
ulcer management. (Level C)

Recommendation 2
A comprehensive clinical history and physical examination includes:
■ *blood pressure measurement;*
■ *weight;*
■ *blood glucose level;*
■ *doppler measurement of Ankle Brachial Pressure Index (ABPI);*
■ *any other tests relevant to presenting patient's condition;*
■ *ulcer history;*
■ *ulcer treatment history;*
■ *medical history;*
■ *medication;*
■ *bilateral limb assessment;*
■ *pain;*
■ *nutrition;*
■ *allergies;*
■ *psychosocial status (including quality of life); and*
■ *functional, cognitive, emotional status and ability for self-care.*
The above should be documented in a structured format for a client presenting with either their first or recurrent leg ulcer
and should be ongoing thereafter. (Level C)

This recommendation has been modified to incorporate original Recommendations 2, 3, 4, 6, 7, 13 and 26, in
order to emphasize the essential components of a comprehensive clinical assessment. *Any other tests relevant*
to presenting patient's condition, ulcer treatment history, medical history and *medications* have also been
added to reflect components of an assessment that may provide valuable information towards the development
of an appropriate treatment plan.

A comprehensive clinical history and physical examination will provide important information regarding the underlying etiology of the ulcer. There are several types of leg ulcers whose treatment is beyond the scope of the guideline. The recommendations presented here were developed specifically for the management of leg ulcers related to venous disease. Appendix M (page 16 of this supplement) provides a description of physical findings that would indicate venous disease versus arterial disease.

Recommendation 5
An Ankle Brachial Pressure Index (ABPI) measurement should be performed by a trained practitioner to rule out the presence of peripheral arterial disease, particularly prior to the application of compression therapy. (Level B)

This recommendation has been modified to emphasize the role of Ankle Brachial Pressure Index (ABPI) measurement within the scope of nursing practice and represents a combination of original Recommendations 9 and 10. In the management of venous leg ulcers, ABPI measurement offers valuable information as a screening tool for lower extremity peripheral arterial disease (Hirsch et al., 2006). Where peripheral arterial disease is suspected, compression therapy treatments designed for venous leg ulcers may be contraindicated. ABPI may also offer prognostic data that are useful to predict limb survival, wound healing and patient survival. The use of ABPI measurement for diagnosis is generally outside of the scope of nursing practice. Furthermore, only those practitioners with the appropriate knowledge, skill and judgement to perform this measurement should do so.

Recommendation 6
An Ankle Brachial Pressure Index (ABPI) >1.2 and <0.8 warrants referral for further medical assessment.
(Level C)

Assessment and Management of Venous Leg Ulcers Discussion of Evidence: The importance of making an objective etiological diagnosis by measuring the Ankle Brachial Pressure Index (ABPI), in addition to visual inspection of the ulcer, pedal pulse palpation and a thorough clinical and physical assessment, is highlighted in a number of studies (CREST, 1998a; Moffatt, Oldroyd, Greenhalgh & Franks, 1994). Expert opinion recommends that the ABPI is used to rule out arterial disease and to determine the safe use of therapeutic compression therapy (RNAO Consensus Panel, 2004). The Royal College of Nursing (1998) also notes that all clients should be given the benefit of Doppler ultrasound management to ensure detection of arterial insufficiency, which could result in commencement of inappropriate or even dangerous therapy. According to Zink et al. (2000), the Trendelenburg test also assists in the physical evaluation of venous valve competence in the perforators and saphenous system. Research evidence cautions that Doppler ultrasound measurements of ABPI can be unreliable

if operators have not undergone training, adding that reliability can be considerably improved if operators have received instruction and training to undertake this measure (Cornwall et al.,1986). Based on available research from the New Zealand Guidelines Group (1999), Doppler ultrasound measurement of ABPI should be repeated when: a leg ulcer deteriorates an ulcer is not fully healed within three months clients present with recurrence (of whichever leg) there is a sudden increase in pain colour and/or temperature of foot changes (RCN, 1998). In addition, the New Zealand Guidelines Group (1999) recommended that: The presence of palpable foot pulses alone are insufficient to rule out arterial disease.

All ulcers should be screened for arterial disease using Doppler ultrasound to determine the Ankle Brachial Pressure Index (ABPI). A single measure of ABPI < 0.8 makes the presence of peripheral arterial occlusive disease (PAOD) highly likely. Further tests should be considered prior to initiating compression bandaging if a client has an ABPI > 0.8 in the presence of signs and symptoms of PAOD, rheumatoid arthritis, diabetes mellitus or systemic vasculitis. Clients with ABPI < 0.6 should be considered for referral to a vascular surgeon.

AWMA
Essential in comprehensive assessment is the identification of the aetiology of the leg ulcer. Specifically,
an assessment to identify the aetiology of the ulcer is essential before commencing compression therapy
as damage to the lower limb can result if compression is applied to underlying arterial aetiology.33,34
Assessment should seek to identify comorbidities that may influence treatment of the VLU and/or require
concurrent management. Comorbidities that require further investigation and management include
peripheral arterial disease, rheumatoid arthritis, vasculitis, a past history of multiple skin cancers (lesions)
and diabetes mellitus.33,34
Assessment should be conducted and documented by a health professional with education and experience in the management of VLUs.25,32-34 Assessment should include a medical and surgical history,
examination of the leg, vascular assessment, biochemical analysis, microbiological analysis, nutritional
assessment, psychological and social assessments and past treatments for venous ulcers.
Medical and surgical history
A clinical history indicative of a leg ulcer of venous origin includes:34
• confirmed venous disease
• family history of leg ulceration
• varicose veins
• previous or current DVT
• decrease of calf muscle pump function
• phlebitis
• surgery or trauma of the affected leg
• chest pain, haemoptysis or pulmonary embolism
• occupations of prolonged standing or sitting
obesity
• multiple pregnancies.

The patient's leg ulcer history helps develop a comprehensive picture of the disease history. Information
that can assist in diagnosis and development of a treatment plan includes:34
• the duration of the current ulcer
• previous ulcers and the time they have taken to heal
• time spent free of venous ulcers
• strategies used to manage previous venous ulcers.

Vascular assessment
The aim of vascular assessment is to distinguish arterial aetiologies from venous and other aetiologies and
assess the extent of venous insufficiency.

Only one trial investigating methods of assessing patients with VLUs was identified in the literature search. The trial provided low-quality evidence on the efficacy of pulse oximetry that was insufficient to make a research-based recommendation. The Expert Working Committee concurs with other expert groups25,32-34 that patient investigations could be used to support diagnosis. Vascular assessment The aim of vascular assessment is to distinguish arterial aetiologies from venous and other aetiologies and assess the extent of venous insufficiency.

Doppler ultrasound measurement of ABPI is the investigation most frequently used to identify arterial aetiology.25,32-35 However, results can be unreliable when ABPI is conducted by untrained health professionals and in patients with calcification or diabetes.34 It may also be difficult to perform accurately in patients with severe oedema, lymphoedema, very painful ulcers or extensive ulceration.35 TBPI may prove more accurate for identifying arterial perfusion in the feet and toes of patients with diabetes and renal disease with an ABPI of greater than 1.3 mmHg.44 Pulse oximetry could be considered to support the diagnosis of a venous ulcer; however, there is insufficient evidence (one low-quality study) to recommend this investigation as a primary diagnostic tool.33,35

Table 6.2: Investigations	
Blood pressure (BP)[25,32,34,35]	Measures the pressure of the blood on the vessel walls using a sphygmomanometer. It provides an indication of the possible presence of a range of cardiovascular diseases. The systolic BP is used in the calculation of ABPI.
Ankle brachial pressure index (ABPI)[25,30,32-35]	A non-invasive vascular test using Doppler ultrasound that identifies large vessel peripheral arterial disease in the leg. It is used to determine adequate arterial blood flow in the leg before use of compression therapy. Systolic BP is measured at the brachial artery and also at the ankle level. Using these measurements, ABPI is calculated as the highest systolic blood pressure from the foot arteries (either dorsalis pedis or posterior tibial artery) divided by the highest brachial systolic pressure, which is the best estimate of central systolic blood pressure.[41] An ABPI of 0.8 to 1.2 is usually considered indicative of good arterial flow in the absence of other clinical indicators for arterial disease. An ABPI of less than 0.8 and a clinical picture of arterial disease should be considered as arterial insufficiency. An ABPI above 1.2 is suggestive of possible arterial calcification. ABPI = highest systolic foot pressure / Highest systolic brachial blood pressure
Duplex ultrasound[30]	A non-invasive test that combines ultrasound with Doppler ultrasonography, in which the blood flow through arteries and veins can be investigated to reveal obstructions.[42]
Photoplethysmography (PPG)[30]	A non-invasive test that measures venous refill time by using a small light probe that is placed on the surface of the skin just above the ankle. The test requires the patient to perform calf muscle pump exercises for brief periods followed by rest.[43] The PPG probe measures the reduction in skin blood content following exercise. This determines the efficiency of the musculovenous pump and the presence of abnormal venous reflux. Patients with problems with the superficial or deep veins usually have poor emptying of the skin and abnormally rapid refilling usually less than 25 seconds
Pulse oximetry[33,35]	A non-invasive test that measures the red and infrared light absorption of oxygenated and deoxygenated haemoglobin in a digit. Oxygenated haemoglobin absorbs more infrared light and allows more red light to pass through a digit. Deoxygenated haemoglobin absorbs more red light and allows more infrared light to pass through the digit. There is insufficient evidence to recommend this investigation as the primary diagnostic tool.[33,35]
Toe brachial pressure index (TBPI)	A non-invasive test that measures arterial perfusion in the toes and feet. A toe cuff is applied to the hallux (or second toe if amputated) and the pressure is divided by the highest brachial systolic pressure, which is the best estimate of central systolic blood pressure. The TBPI is used to measure arterial perfusion in the feet and toes of patients with incompressible arteries due to calcification which may occur in patients with diabetes and renal disease.[44]
Transcutaneous oxygen ($TCPO_2$)[30]	Measures the amount of oxygen reaching the skin through blood circulation. There is insufficient evidence to recommend this investigation as the primary diagnostic test.[33,35]

Lisaks

Phlebology. 2014 May 19;29(1 suppl):153-156. [Epub ahead of print]

Dutch Venous Ulcer guideline update.
Maessen-Visch MB[1], de Roos KP[2].

A duplex ultrasound should be performed in every patient to establish the underlying aetiology and to evaluate the need for treatment (which is discussed in a separate guideline).

(chronic[All Fields] AND ("varicose ulcer"[MeSH Terms] OR ("varicose"[All Fields] AND "ulcer"[All Fields]) OR "varicose ulcer"[All Fields] OR ("venous"[All Fields] AND "leg"[All Fields] AND "ulcer"[All Fields]) OR "venous leg ulcer"[All Fields]) AND ("ankle brachial

index"[MeSH Terms] OR ("ankle"[All Fields] AND "brachial"[All Fields] AND "index"[All Fields]) OR "ankle brachial index"[All Fields])) AND ((Meta-Analysis[ptyp] OR Randomized Controlled Trial[ptyp] OR systematic[sb]) AND ("2005/01/01"[PDAT] : "2015/12/31"[PDAT]))
Leitud 5, ei ole sobilikud

(chronic[All Fields] AND ("varicose ulcer"[MeSH Terms] OR ("varicose"[All Fields] AND "ulcer"[All Fields]) OR "varicose ulcer"[All Fields] OR ("venous"[All Fields] AND "leg"[All Fields] AND "ulcer"[All Fields]) OR "venous leg ulcer"[All Fields]) AND ("ankle"[MeSH Terms] OR "ankle"[All Fields] OR "ankle joint"[MeSH Terms] OR ("ankle"[All Fields] AND "joint"[All Fields]) OR "ankle joint"[All Fields]) AND ("ultrasonography"[MeSH Terms] OR "ultrasonography"[All Fields] OR "sonography"[All Fields])) AND ((Meta-Analysis[ptyp] OR Randomized Controlled Trial[ptyp] OR systematic[sb]) AND ("2005/01/01"[PDAT] : "2015/12/31"[PDAT]))
2 allikat, ei sobi

(chronic[All Fields] AND ("varicose ulcer"[MeSH Terms] OR ("varicose"[All Fields] AND "ulcer"[All Fields]) OR "varicose ulcer"[All Fields] OR ("venous"[All Fields] AND "leg"[All Fields] AND "ulcer"[All Fields]) OR "venous leg ulcer"[All Fields])) AND ("phlebography"[MeSH Terms] OR "phlebography"[All Fields]) AND ((Meta-Analysis[ptyp] OR Randomized Controlled Trial[ptyp] OR systematic[sb]) AND ("2005/01/01"[PDAT] : "2015/12/31"[PDAT]))

0 tulemust