Spring Fling
2018

Vascular Primer

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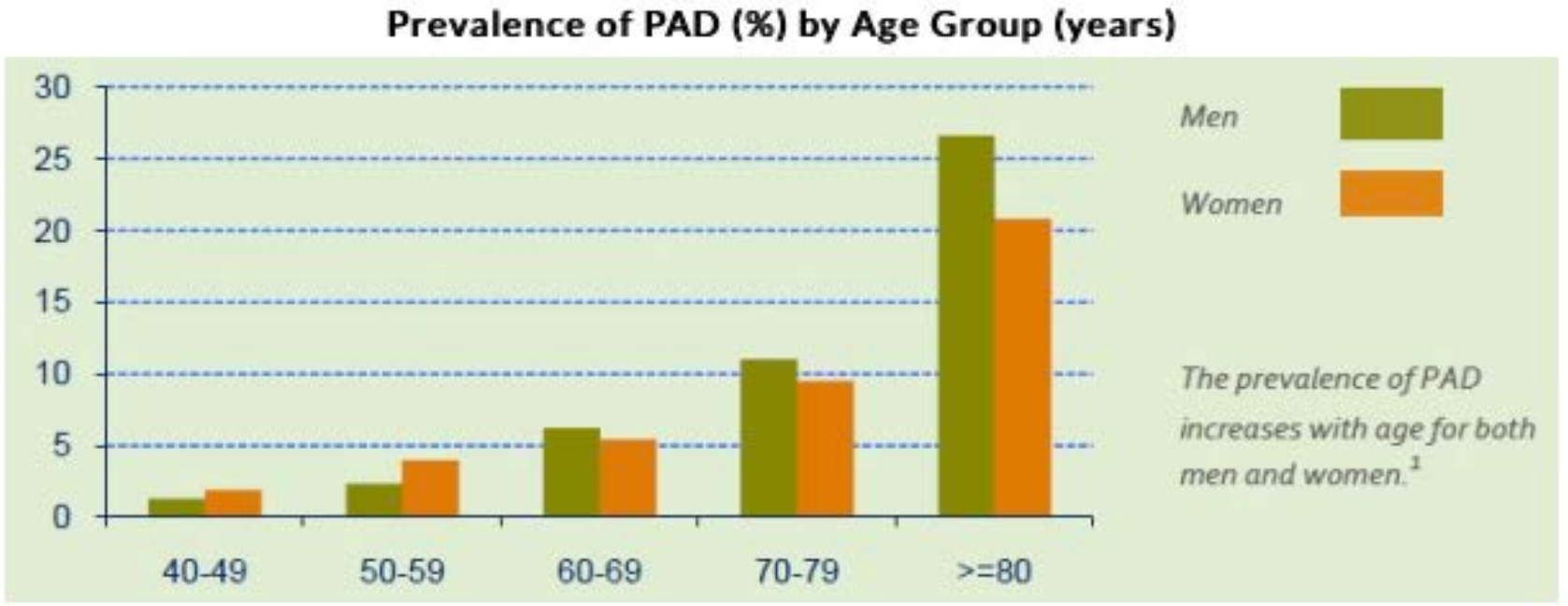
Disclosure

I have no relevant financial relationships or affiliations with commercial interests to disclose.

Goals of our 50 min Together

- Review the incidence and prevalence of vascular disease (arterial and venous)
- Review vascular exam findings
- Review signs and symptoms of common vascular disorders
- Brief overview of diagnostic testing

Arterial Vascular Disease Prevalence



2011 Center for Disease Control and Prevention Statistics

8-12 Million People in USA

- Men and woman are equally affected by PAD
- General population awareness of PAD is estimated at 25%

2011 Center for Disease Control and Prevention Statistics

Ethnic-specific Prevalence of PAD

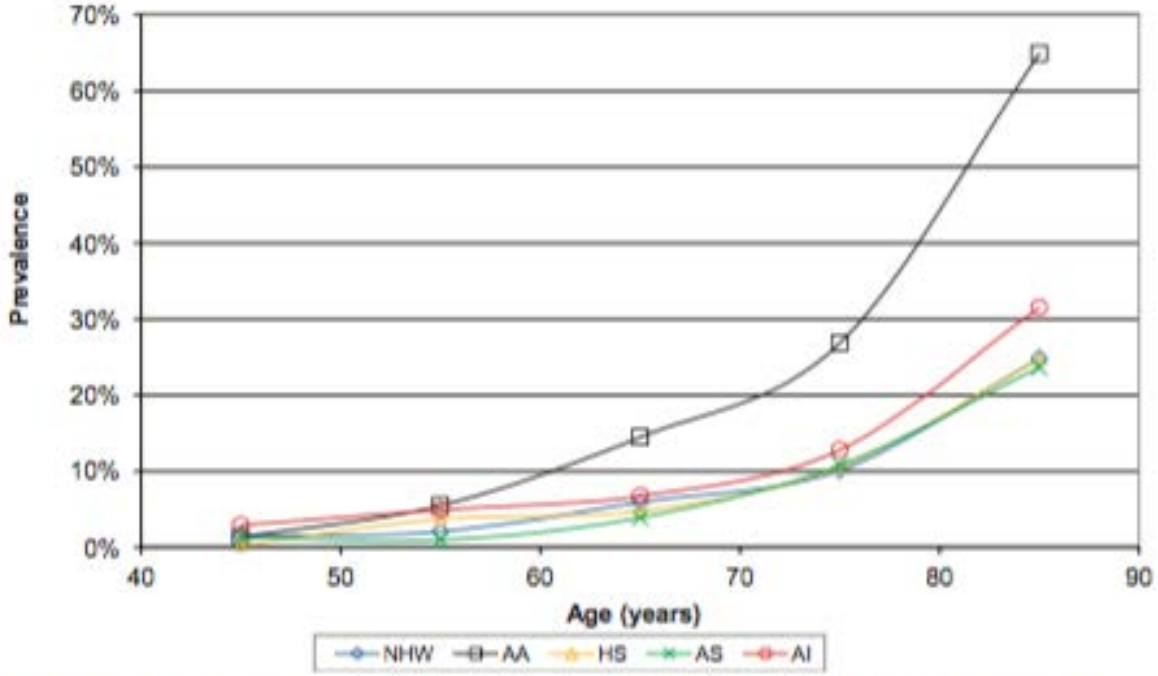
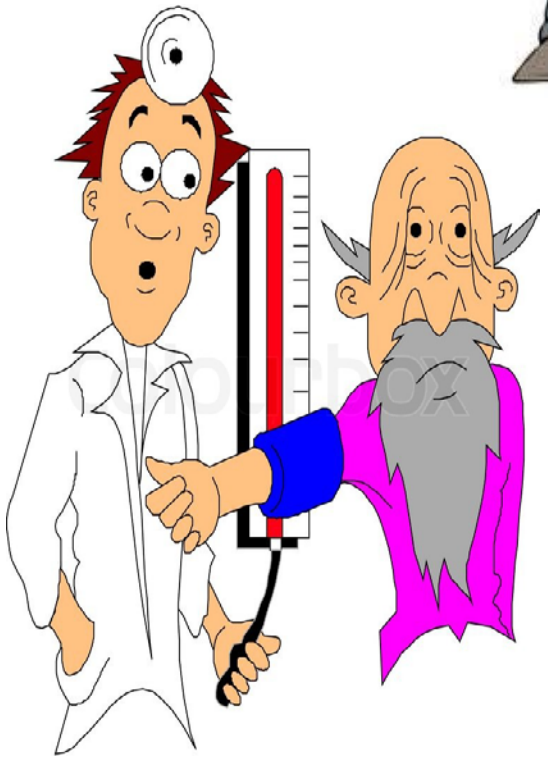


Figure 1. Ethnic-specific prevalence of peripheral arterial disease in men in the United States.[18] AA indicates African Americans; AI, American Indians; AS, Asian Americans; HS, Hispanics; and NHW, non-Hispanic whites.

Circ Res. 2015;117:e12

PAD Risk Factors



Odds Ratios for Risk Factors

JOURNAL OF VASCULAR SURGERY
March Supplement 2015

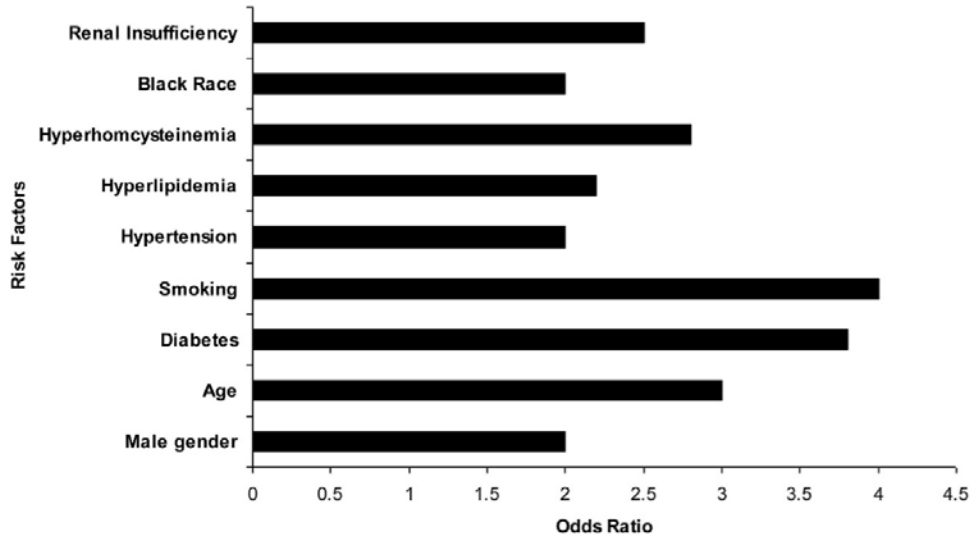


Fig 1. The approximate odds ratios (ORs) for risk factors associated with the development of peripheral arterial disease (PAD). Adapted from Inter-Society Consensus for the Management of Peripheral Arterial Disease (TASC II).[9]

Vascular Exam: PAD

- Should include examination of the ocular fundus and skin as well as the arterial, venous, and lymphatic systems.

"More budget cuts. One gown per room. Who wants to wear it first?"

Vascular Exam: Inspection

- Appearance of skin
  - Demarcation or transition
  - Shiny

- Hair growth
- Discoloration or rash
- Swelling
- Ulcer or wound

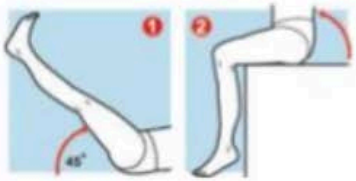
Vascular Exam: Inspection and Palpation

- Muscle atrophy
- Toenail growth

- Touch
  - Skin texture
  - Temperature
  - Pain level

Vascular Exam: Palpation

- Abdomen
- Distal pulses
- Capillary refill



Buerger's test

Patient on his back

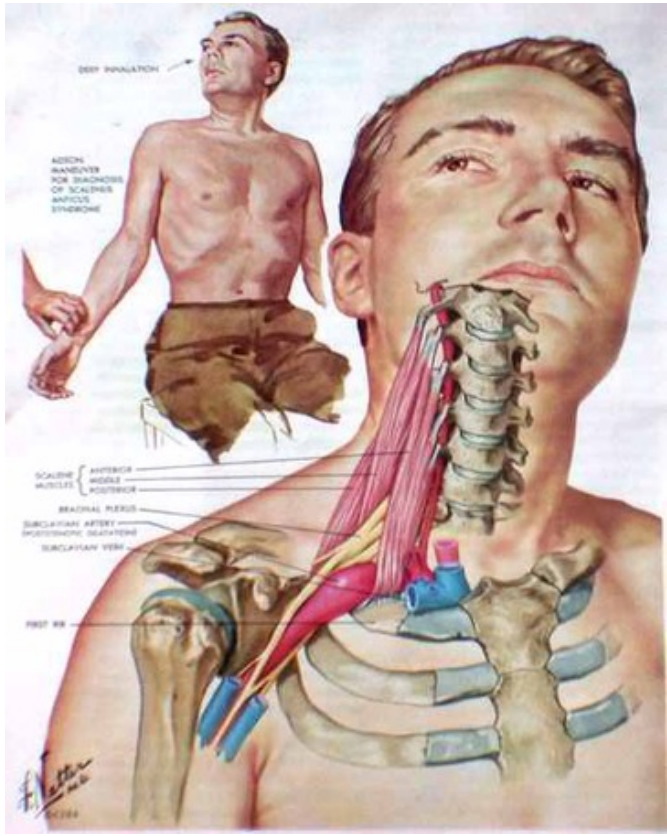
A-Rising the affected limb cause **blanching** within 2-3 M.

B-Lowering the leg below the below the horizontal plane leads to **cyanotic congestion**

Bureger's angle : is the angle of elevation ay which the pallor occurs

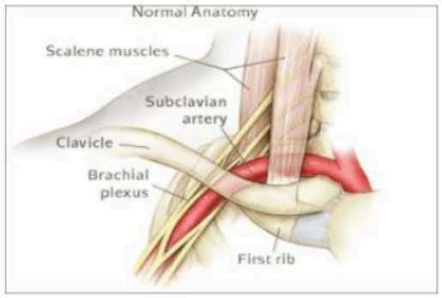
Normally no change of color occur whatever the position of the limb.

Thoracic outlet syndrome



ADSON or scalene maneuver

- Radial pulse diminishes and disappears on turning chin to same side.
- Decreases space between scaleneus anterior and medius .



Most Common Presentation

- **Occult or Asymptomatic PAD!**

- PAD patients die mostly of **cardiac** and **cerebrovascular-related** events and much less frequently due to obstructive disease of the lower extremities.

Atherosclerosis. 2006;189:61-69.

Clinical Presentation of PAD

- 20-50% Asymptomatic, diagnosis by ABI or other imaging
- 40-50% atypical leg pain
- 10-35% claudication
- 2% critical limb ischemia

Rosinberg,A;Kibbe,M.(2011).EvaluationofPAD. PeriphVascInterv (2nd Ed.,pp8-17).

Symptoms

Latin root=
Limping

- **Claudication**: Intermittent cramping pain or discomfort, often in the calf, that occurs consistently and reproducibly with exertion, causing the patient to stop walking, and is relieved by rest. Will sometimes occur in the buttocks and hips. Can cause weakness

- **Atypical symptoms**: Similar to above but not severe enough to cause patient to stop walking or may not be relieved with rest

JAMA 2001;286:1317-1324

Clinical Spectrum of Claudication

Intermittent (Atherosclerosis)	Neurogenic (Lumbar Spinal Stenosis)	Venous (Deep Vein Thrombosis)
• Pain is in the muscle of the calf, thigh or buttock • Unilateral in femoropopliteal disease • Bilateral in aorto-iliac disease • Gradual onset after walking "claudication distance" • Pain is relieved by rest • Absent/reduced pulses NB. The Claudication distance is a constant distance the patient was able to walk before the onset of symptoms.	• Pain is in whole leg can be associated with tingling and numbness • Bilateral (Can also be less commonly unilateral) • Comes on suddenly on standing up or walking • Relieved by sitting down, bending over and stopping walking • Unable to straighten legs	• Involvement of whole leg. • Pt may describe feeling their "leg is going to burst" • Most commonly unilateral • Gradual onset after beginning to walk • Relief on elevating the leg • Cyanosed • Varicose Veins • Oedematous

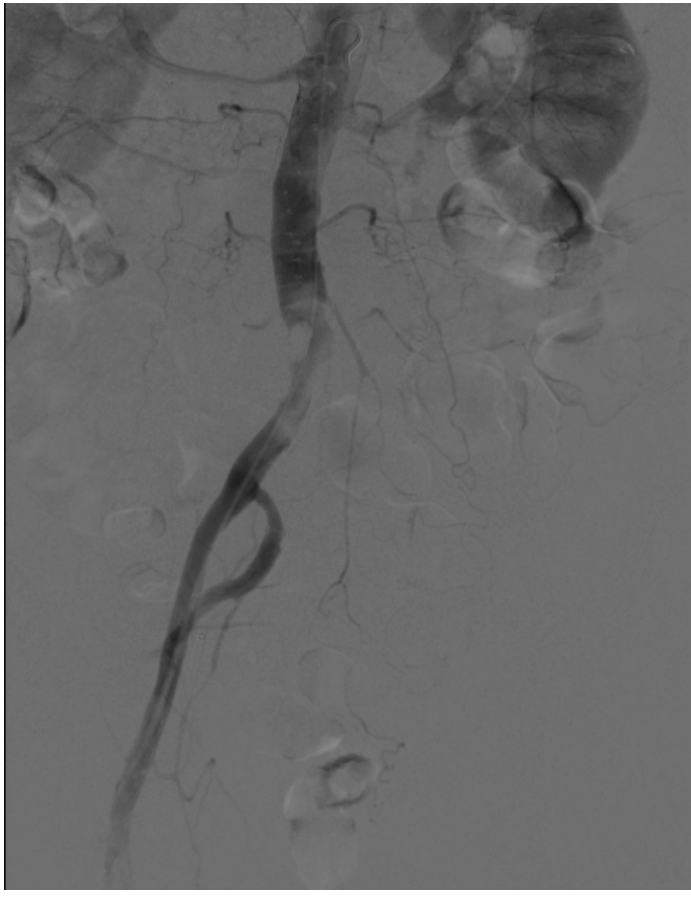
UpToDate 2017

Classification of Claudication

Fontaine		Rutherford		
Stage	**Clinical**	**Grade**	**Category**	**Clinical**
I	Asymptomatic	0	0	Asymptomatic
IIa	Mild claudication	I	1	Mild claudication
IIb	Moderate to severe claudication	I	2	Moderate claudication
		I	3	Severe claudication
III	Ischemic rest pain	II	4	Ischemic rest pain
IV	Ulceration or gangrene	III	5	Minor tissue loss
		III	6	Major tissue loss

Symptoms: Acute or Chronic Limb Ischemia (The “heart attack” of legs)

- **Acute** is sudden onset
  - Most commonly embolus from heart
  - Second most common acute thrombosis on chronic stenosis
- **Chronic** is >2 weeks
  - Collaterals are formed
  - ASSESS THE PATIENTS 6 P’s!!!
    - Pain, palor, paralysis, pulselessness, paresthesia, and poikilothermia



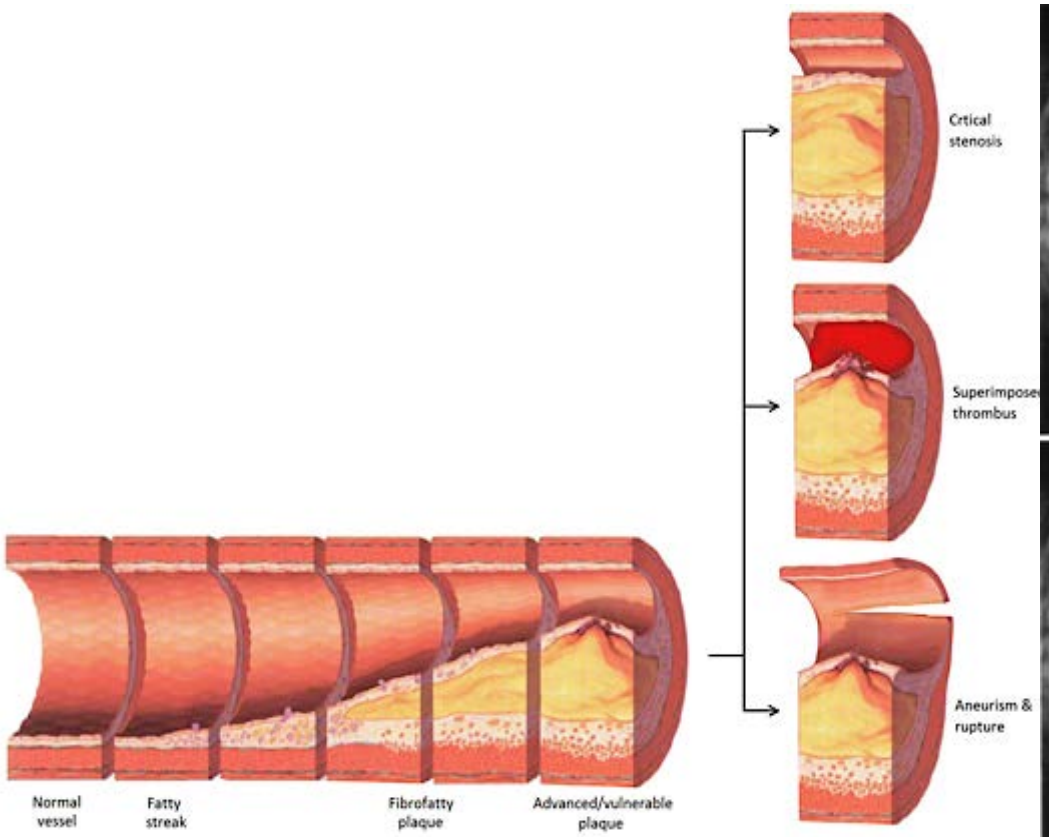
Circ Res. 2015;117:e12

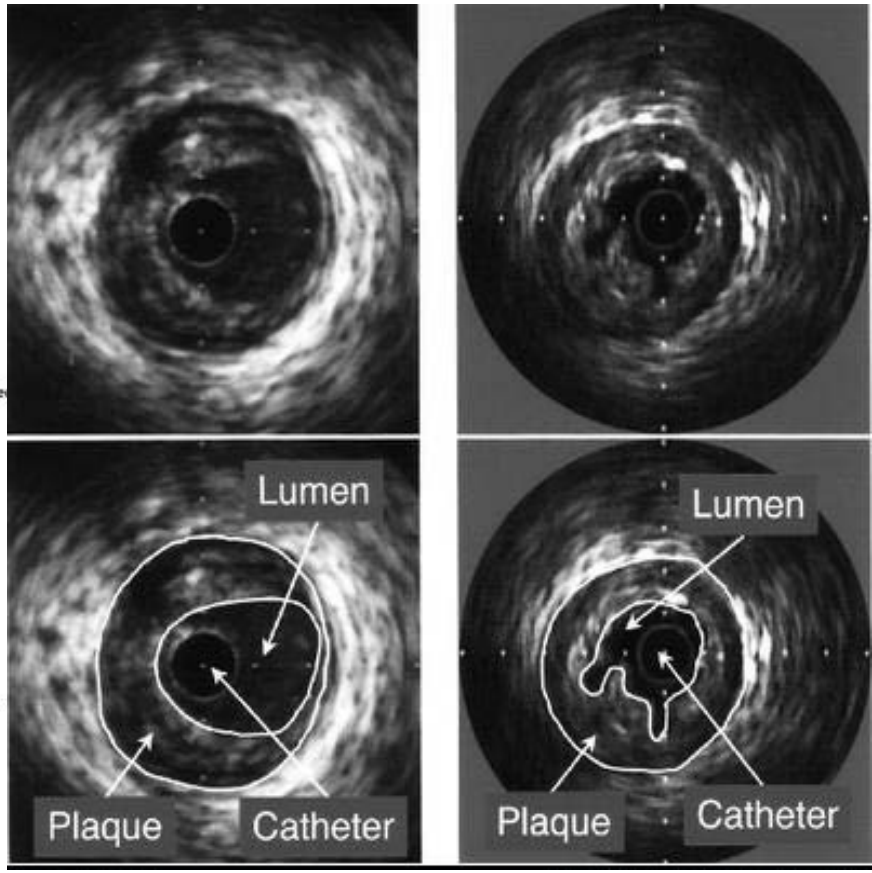
Acute or Chronic Limb Ischemia

- Limb salvage!!!! Amputations= early mortality
- Amputation itself carries 3-20% perioperative mortality
- The 5 year survival rate with CLI patients in the surgical literature is only 50-60%
- Approximately 80% of CLI patients die from cardiovascular or cerebrovascular events

Causes of PAD

- Atherosclerosis…



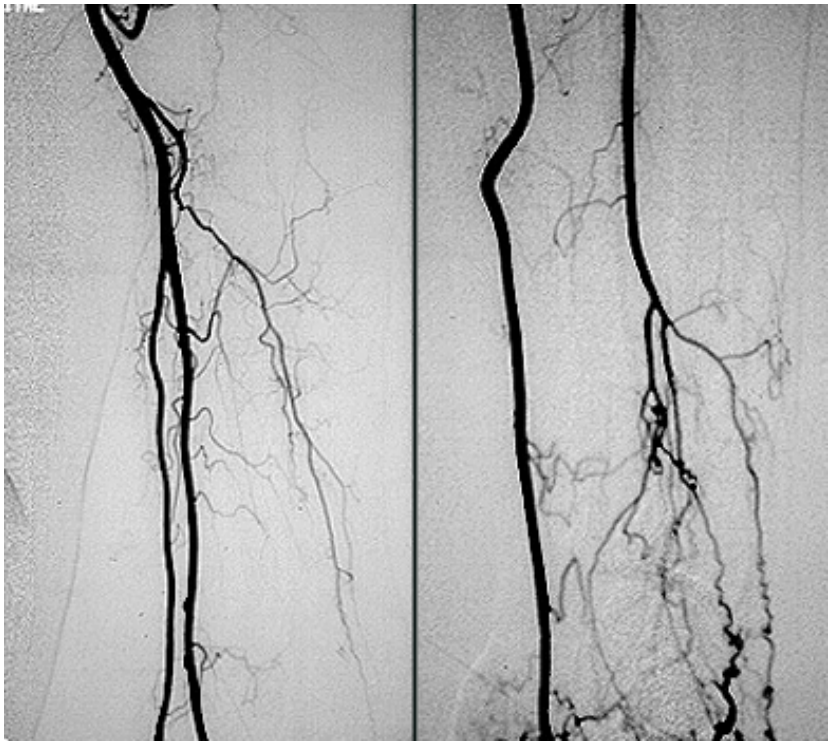


Vascular Disease: Jaff and White 2011;3-18

Causes of PAD

- Atherosclerosis
- Aneurysms
  - emboli
- Trauma/radiation
- Infection
- Fibromuscular dysplasia
- Functional spasms (Raynaud's)
- Vasculitis
  - Buerger's aka thromboangitis obliterans
  - Takayasu arteritis
- Anatomic abnormalities
  - Popliteal entrapment in young patients
  - Iliac syndrome in bicyclists

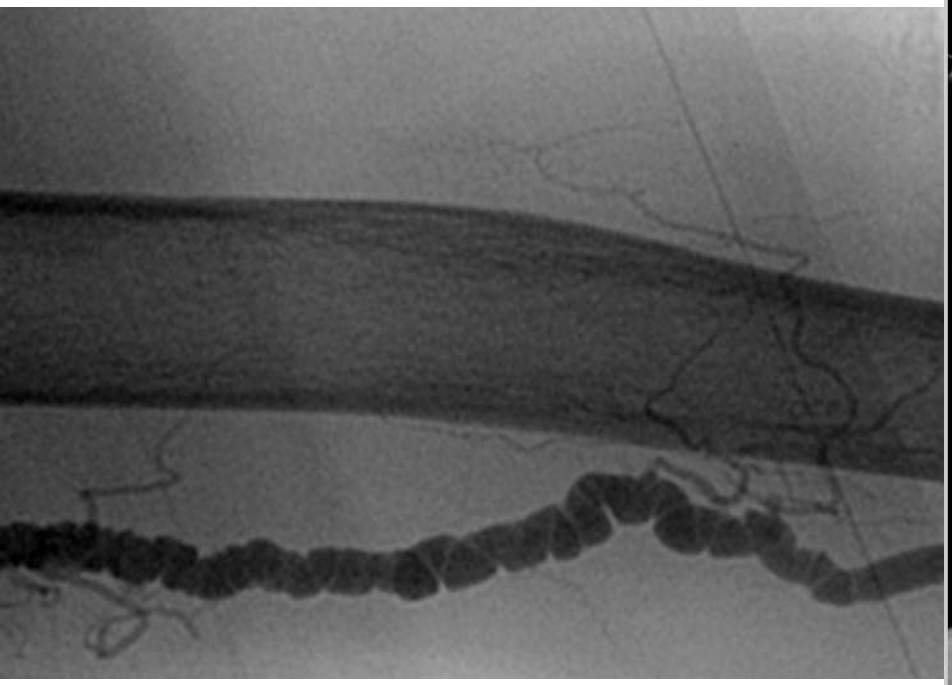
Vascular Disease: Jaff and White 2011;3-18

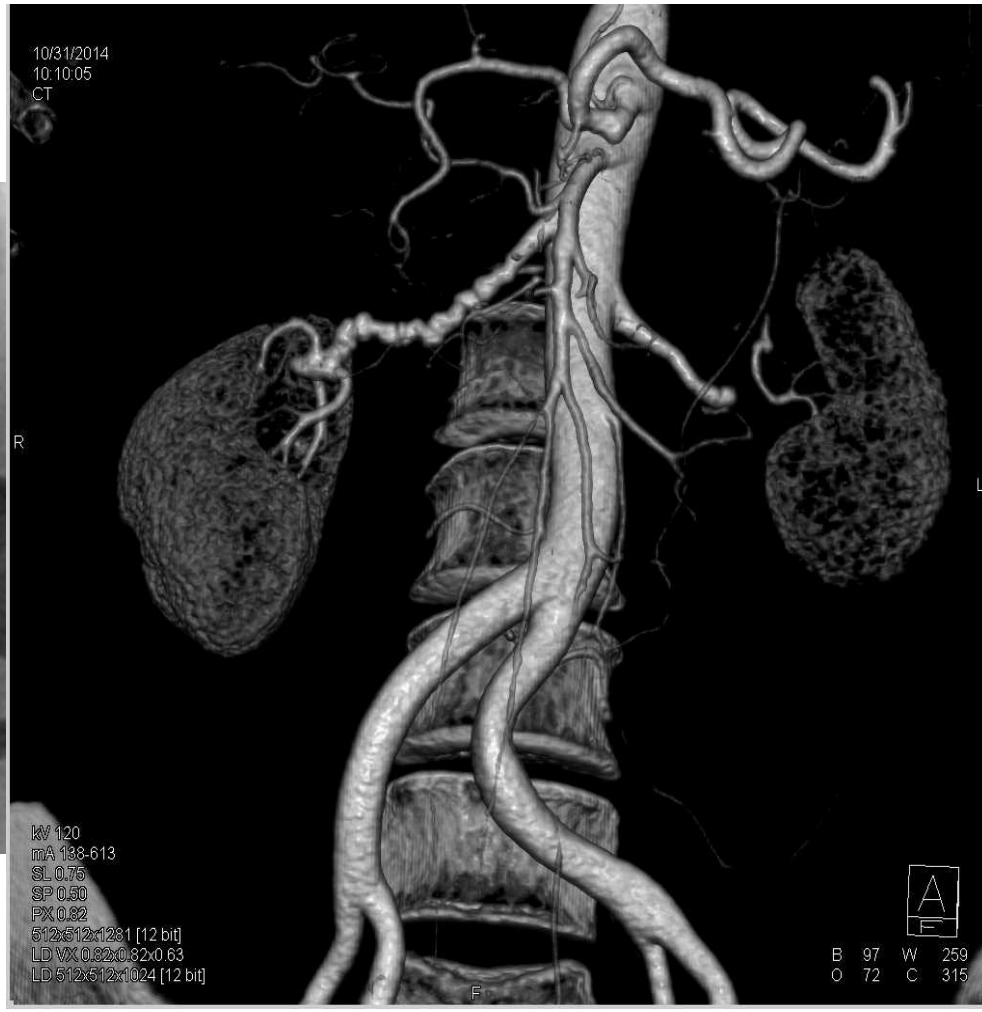


Appearance of Buerger's: Ulnar artery

Takayasu arteritis

Fibromuscular Dysplasia

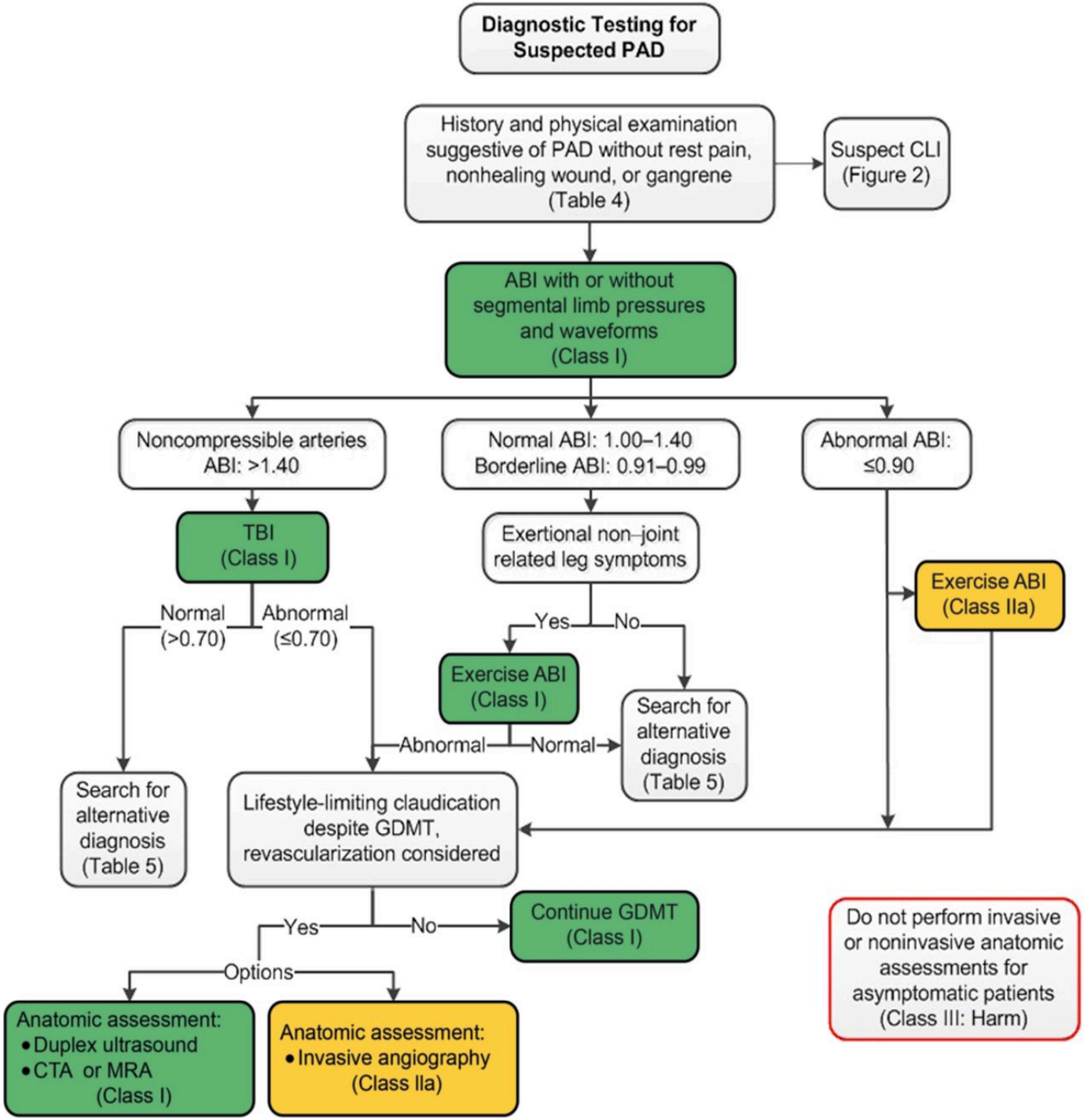




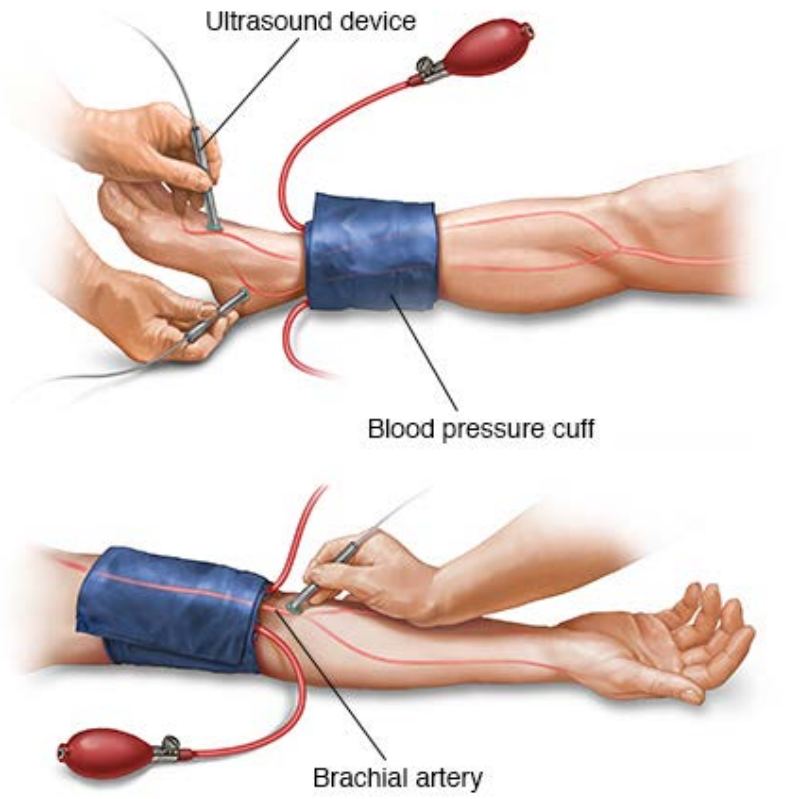
Exam Findings of PAD
Raynaud's
Primary and Secondary

The Appearance of PAD: Arterial Ulcers and Gangrene

The Appearance of PAD: "Blue Toes" from Cholesterol Embolism


Diagnostic Testing for Suspected PAD
History and physical examination suggestive of PAD without rest pain, nonhealing wound, or gangrene (Table 4)
Suspect CLI (Figure 2)
ABI with or without segmental limb pressures and waveforms (Class I)
Noncompressible arteries ABI: >1.40
Normal ABI: 1.00–1.40 Borderline ABI: 0.91–0.99
Abnormal ABI: ≤0.90
TBI (Class I)
Exertional non–joint related leg symptoms
Exercise ABI (Class IIa)
Normal (>0.70)
Abnormal (≤0.70)
Yes
No
Exercise ABI (Class I)
Search for alternative diagnosis (Table 5)
Abnormal
Normal
Search for alternative diagnosis (Table 5)
Lifestyle-limiting claudication despite GDMT, revascularization considered
Yes
No
Continue GDMT (Class I)
Options
Anatomic assessment:
• Duplex ultrasound
• CTA or MRA
(Class I)
Anatomic assessment:
• Invasive angiography
(Class IIa)
Do not perform invasive or noninvasive anatomic assessments for asymptomatic patients (Class III: Harm)

Ankle Brachial Index (ABI)



ABI WORKSHEET

Ankle-Brachial Index Interpretation
Above 0.90: Normal
0.71 - 0.90: Mild Obstruction
0.41 - 0.70: Moderate Obstruction
0.00 - 0.40: Severe Obstruction

Right Arm:
Systolic Pressure ___ mmHg

Left Arm:
Systolic Pressure ___ mmHg

Right Ankle:
Systolic Pressure
Posterior Tibial (PT) ___ mmHg
Dorsalis Pedis (DP) ___ mmHg

Left Ankle:
Systolic Pressure
Posterior Tibial (PT) ___ mmHg
Dorsalis Pedis (DP) ___ mmHg

Right ABI equals Ratio of:
Higher of the Right Ankle Pressures (PT or DP) ___ mmHg
Higher Arm Pressure (right or left arm) ___ mmHg = ___ *

Left ABI equals Ratio of:
Higher of the Left Ankle Pressures (PT or DP) ___ mmHg
Higher Arm Pressure (right or left arm) ___ mmHg = ___ *

* The lower of these numbers is the patient's overall ABI.
Overall ABI (lower ABI) = _____

Table 2. Consensus Recommendations on ABI Measurement

Steps	(1) Measurement of ABI	(2) Measurement of Systolic Pressures of the 4 Limbs	(3) Calculation of ABI	(4) Use and Interpretation of the ABI if Clinical Presentation of PAD	(5) Interpretation of ABI as a Marker of Subclinical CVD and Risk in Asymptomatic Individuals
1	Doppler Method SBP in each arm SBP in each ankle	Sequence of ABI at rest First arm First PT artery First DP artery Other PT artery Other DP artery Other arm	For each leg: divide higher of the PT or DP pressure by higher of the right or left arm SBP	ABI used as a first-line noninvasive test for diagnosis of PAD	ABI provides incremental information beyond standard risk scores in predicting future CVD events
2	Cuff size Width at least 40% of limb circumference	If the SBP of first arm is greater than SBP of other arm by at least 10 mm Hg, repeat BP of first arm and disregard first measurement	As a diagnostic tool for patients with PAD symptoms, each leg is reported separately	ABI≤0.90 is the threshold for confirming diagnosis of lower-extremity PAD	ABI≤0.90 or ≥1.40=increased risk of CVD events and mortality
3	Ankle cuff placement Just above the malleoli Straight wrapping method	…	As a prognostic marker for CVD, use lower of the left and right ABIs (exception: noncompressible arteries)	If ABI>0.90 with clinical suspicion of PAD=use postexercise ABI or other noninvasive tests	ABI between 0.91 and 1.00 is borderline for CVD risk; further evaluation is appropriate
4	Open lesions covered with impermeable dressing		When ABI between 0.80 and 1.00, it is reasonable to repeat the measurement	Postexercise ankle pressure decrease of >30 mm Hg or postexercise ABI decrease of >20%=diagnostic criteria for PAD	…
5	…	…	…	If ABI>1.40 with clinical suspicion of PAD=use toe brachial index or other noninvasive tests	…

ABI indicates ankle-brachial index; BP, blood pressure; CVD, cardiovascular disease; DP, dorsalis pedis; MI, myocardial infarction; and PAD, peripheral artery

Relationship of High and Low Ankle Brachial Index to All-Cause and Cardiovascular Disease Mortality

The Strong Heart Study

Helaine E. Resnick, PhD, MPH; Robert S. Lindsay, MB, PhD; Mary McGrae McDermott, MD; Richard B. Devereux, MD; Kristina L. Jones, MPH; Richard R. Fabsitz, PhD; Barbara V. Howard, PhD

Background—The associations of low (<0.90) and high (>1.40) ankle brachial index (ABI) with risk of all-cause and cardiovascular disease (CVD) mortality have not been examined in a population-based setting.

Methods and Results—We examined all-cause and CVD mortality in relation to low and high ABI in 4393 American Indians in the Strong Heart Study. Participants had bilateral ABI measurements at baseline and were followed up for 8.3±2.2 years (36 589 person-years). Cox regression was used to quantify mortality rates among participants with high and low ABI relative to those with normal ABI (0.90 ≤ABI ≤1.40). Death from all causes occurred in 1022 participants (23.3%; 27.9 deaths per 1000 person-years), and of these, 272 (26.6%; 7.4 deaths per 1000 person-years) were attributable to CVD. Low ABI was present in 216 participants (4.9%), and high ABI occurred in 404 (9.2%). Diabetes, albuminuria, and hypertension occurred with greater frequency among persons with low (60.2%, 44.4%, and 50.1%) and high (67.8%, 49.9%, and 45.1%) ABI compared with those with normal ABI (44.4%, 26.9%, and 36.5%), respectively ($P<0.0001$). Adjusted risk estimates for all-cause mortality were 1.69 (1.34 to 2.14) for low and 1.77 (1.48 to 2.13) for high ABI, and estimates for CVD mortality were 2.52 (1.74 to 3.64) for low and 2.09 (1.49 to 2.94) for high ABI.

Conclusions—The association between high ABI and mortality was similar to that of low ABI and mortality, highlighting a U-shaped association between this noninvasive measure of peripheral arterial disease and mortality risk. Our data suggest that the upper limit of normal ABI should not exceed 1.40. **(*Circulation*. 2004;109:733-739.)**

Key Words: epidemiology ■ mortality ■ peripheral vascular disease

Ankle-brachial index, toe-brachial index, and cardiovascular mortality in persons with and without diabetes mellitus

Suzanne Hyun, MD,[a] Nketi I. Forbang, MD,[b] Matthew A. Allison, MD, MPH,[b,c] Julie O. Denenberg, MAS,[b] Michael H. Criqui, MD, MPH,[b] and Joachim H. Ix, MD, MAS,[d,e] *Loma Linda and San Diego, Calif*

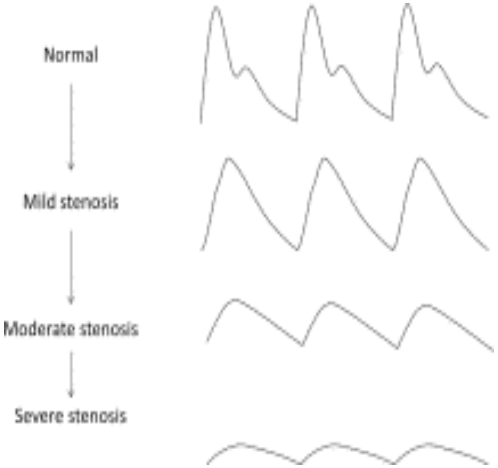
Background: The prognostic utility of the ankle-brachial index (ABI) may be hampered in persons with diabetes due to peripheral arterial stiffening in the ankles. Stiffening of toe arteries occurs infrequently in diabetes. We aimed to determine the nature of the relationship of the toe-brachial index (TBI) and ABI with cardiovascular disease (CVD) mortality and to determine whether the associations are modified in individuals with diabetes.

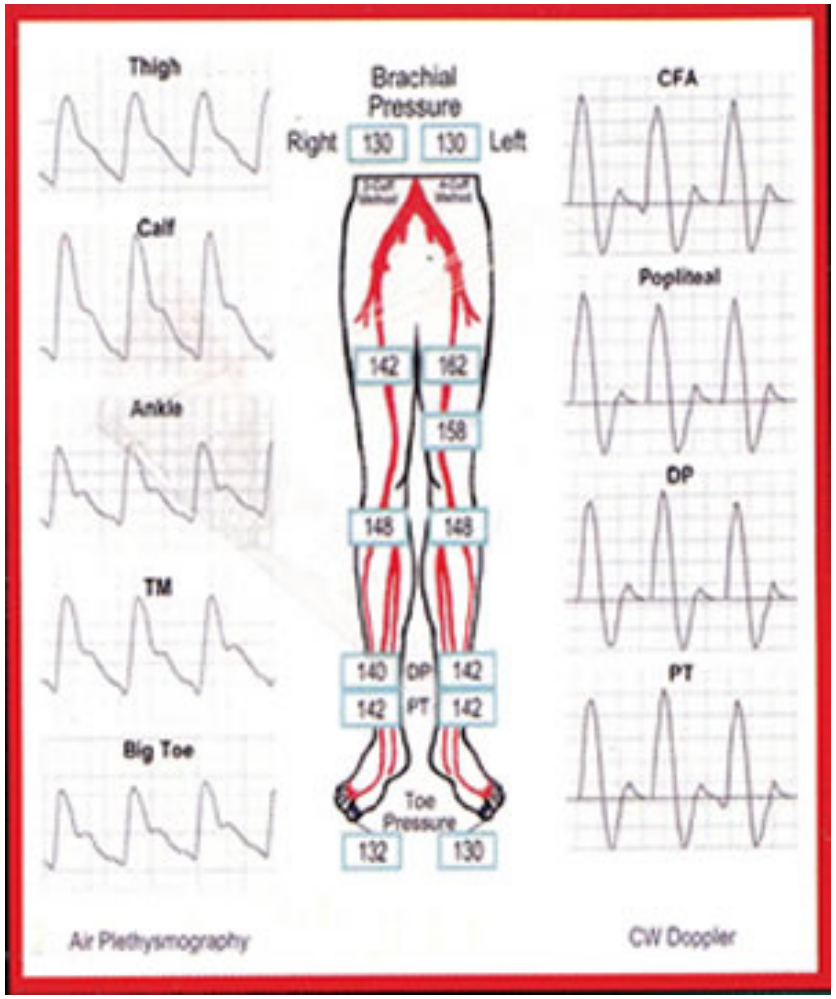
Methods: Individuals with clinically suspected atherosclerotic peripheral arterial disease who underwent ABI and TBI measurements in a vascular laboratory were monitored longitudinally for CVD mortality.

Results: Among 469 participants (89% men), the mean age was 68 ± 9 years, and 36% had diabetes. The mean ABI was 0.83 ± 0.28 and the mean TBI was 0.60 ± 0.24. During median 7.0 years of follow-up, there were 158 CVD deaths. The association of the ABI categories with CVD deaths differed in diabetic vs nondiabetic participants ($P = .002$ for interaction). In contrast, the association of the TBI categories with CVD deaths was similar, irrespective of diabetes status ($P = .17$ for interaction). Among diabetic patients, a U-shaped relationship was observed between ABI categories and CVD death: those with low (<0.90) and high (>1.30) ABIs were both at higher risk than those with normal ABIs (range, 0.90-1.30). In nondiabetic patients, association of ABI categories with CVD death was linear, such that those with an ABI >1.30 were at the lowest risk, whereas those with an ABI <0.90 were at higher risk. In contrast, the association of TBI categories with CVD death was linear irrespective of diabetes status. High TBI categories consistently predicted low risk, whereas risk was higher with progressively lower TBI categories.

Conclusions: Among diabetic individuals with clinically suspected peripheral arterial disease, those with low and high ABIs are both at higher risk of CVD death. In contrast, a linear relationship was observed between TBI categories and CVD death irrespective of diabetes status. These findings suggest that stiffened ankle arteries may limit the predictive value of the ABI in individuals with diabetes, a limitation that may be overcome by measurement of the TBI. (J Vasc Surg 2014;60:390-5.)

Diagnostic Options- Pulse Volume Recording with ABI

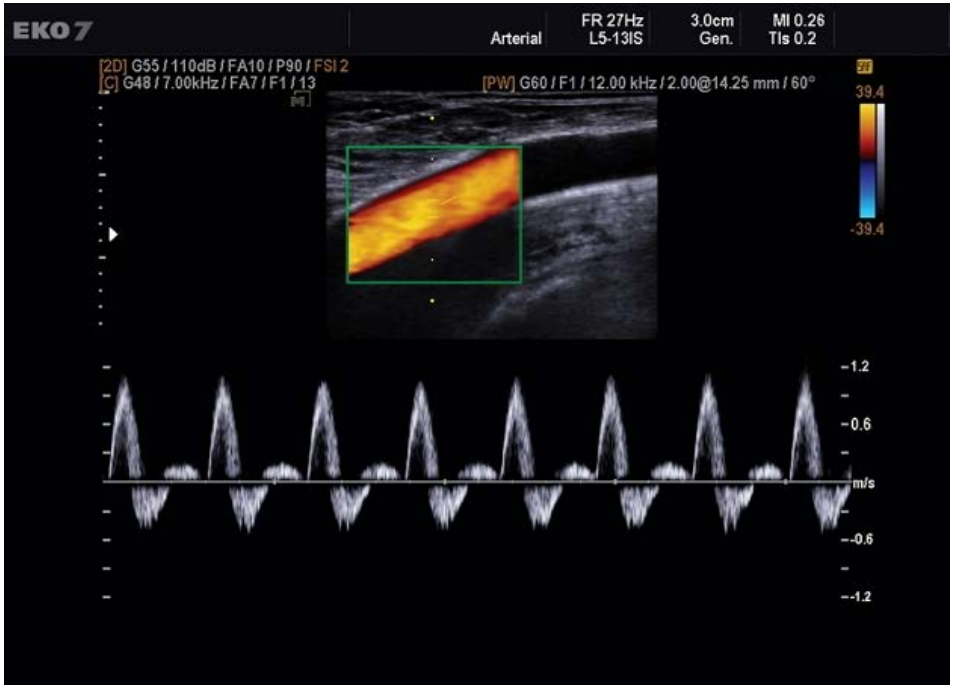




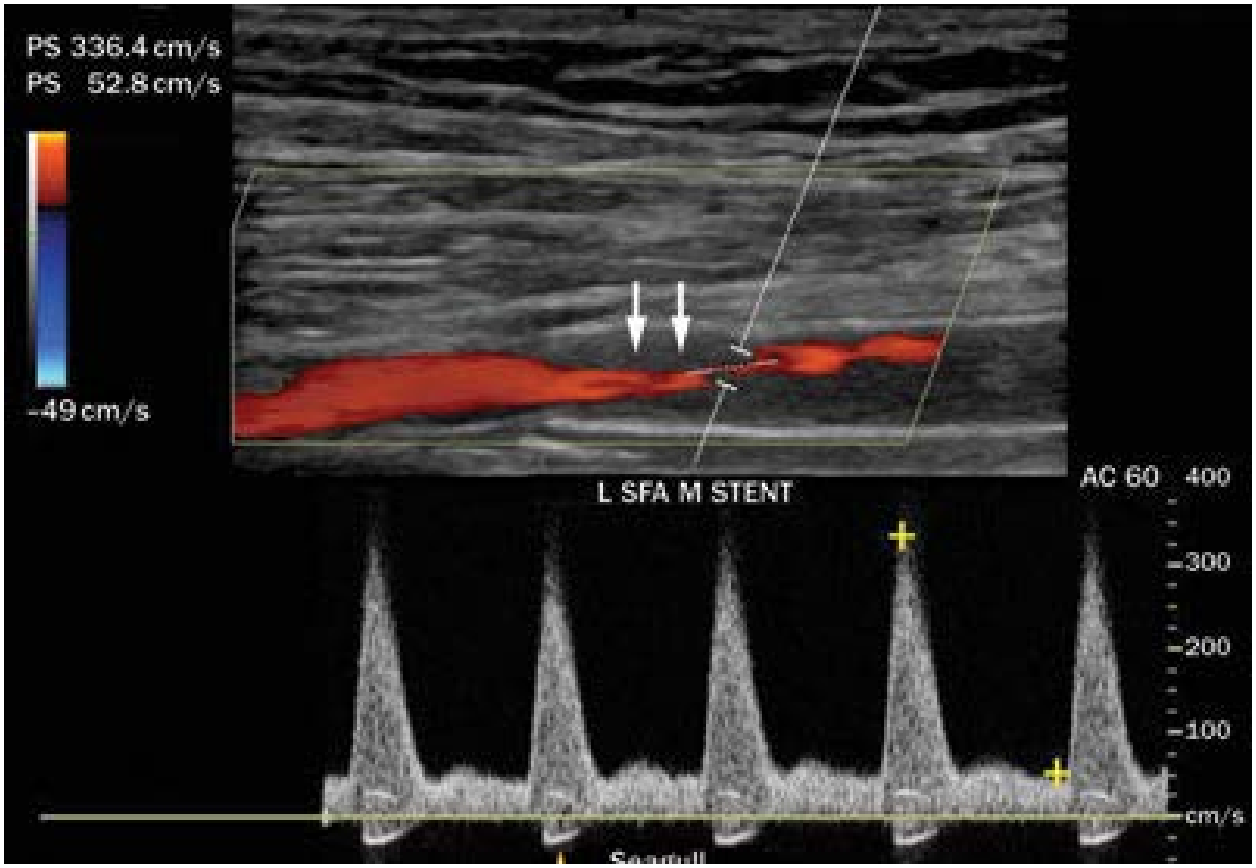
PVR is obtained with a cuff system that incorporates pneumoplethysmography

Diagnostic Imaging

- Doppler US
  - Noninvasive
  - Sonographer experience dependent
  - Useful for diagnosing specific areas of significant stenosis or occlusions
  - No contrast needed- preserves kidneys
  - Lower sensitivity than other imaging techniques



Diagnostic Imaging



Diagnostic Imaging- CTA

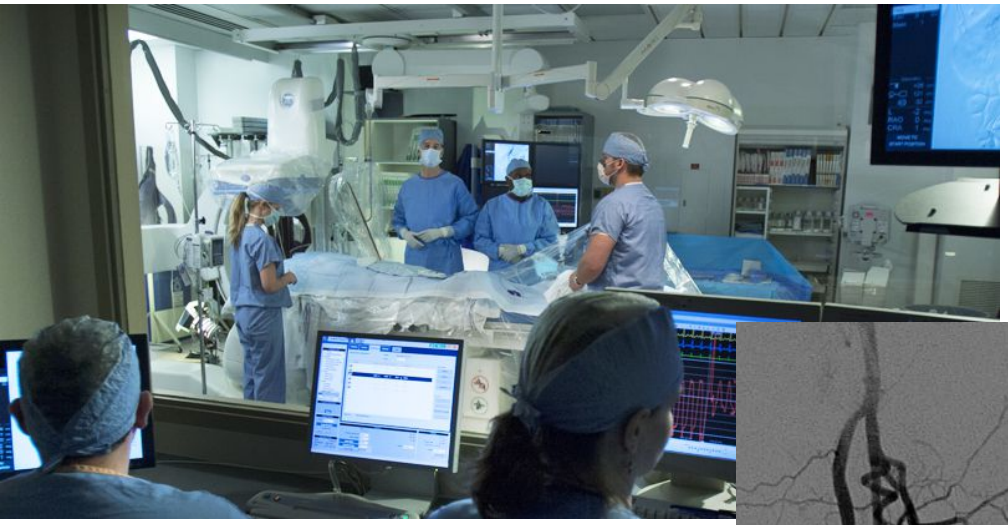
3 D reconstruction

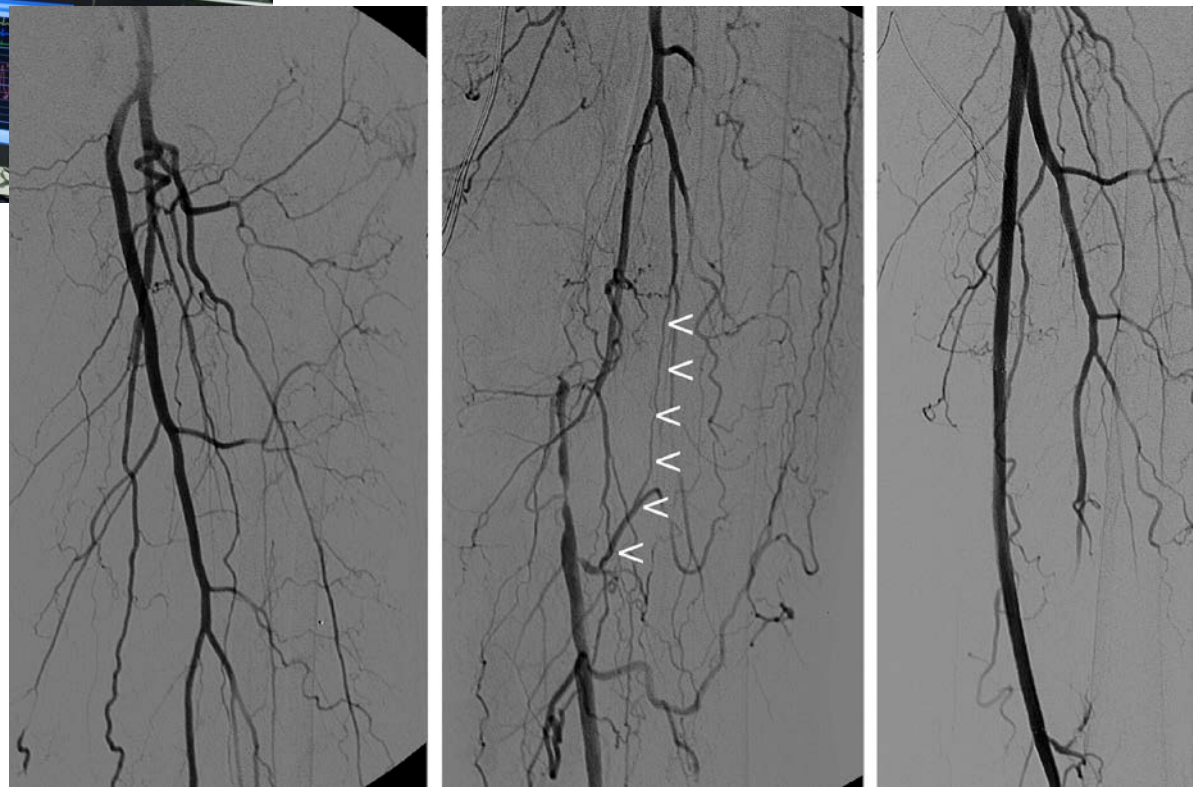
Benefits include high sensitivity and specificity
Downside is the radiation, amount of contrast, and overestimated stenosis

Diagnostic Imaging- Magnetic Resonance Imaging

Benefits of MRA include no radiation, less nephrotoxicity with dye.
Downside is cost, less sensitivity below the knee, artifact if stents have been placed prior and long scan times

Diagnostic Imaging- Conventional Angiogram





“Gold standard”
Benefits include live time therapeutic options
Downsides include invasive risks, contrast, and radiation

Claudicants and Outcomes

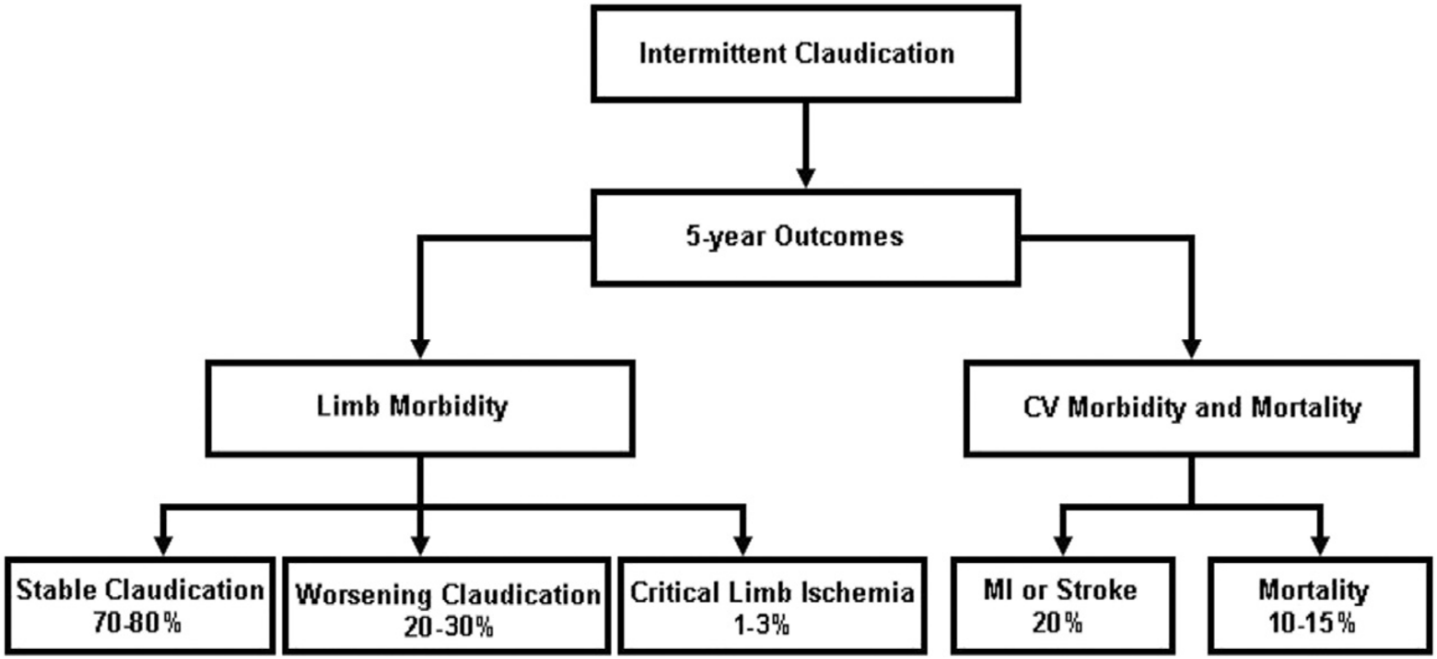
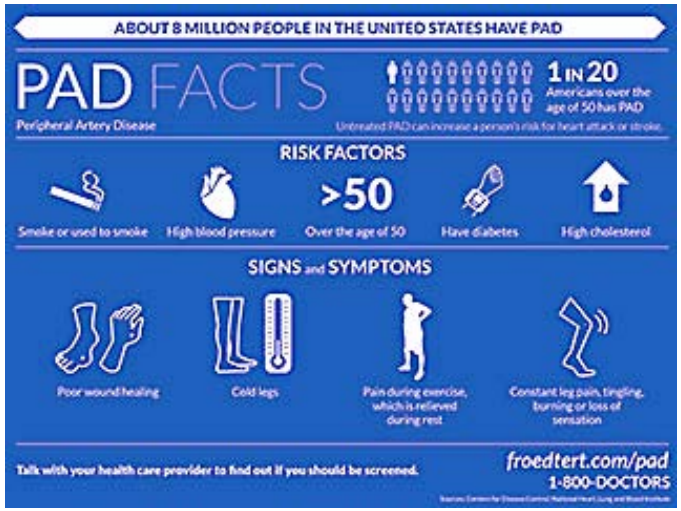
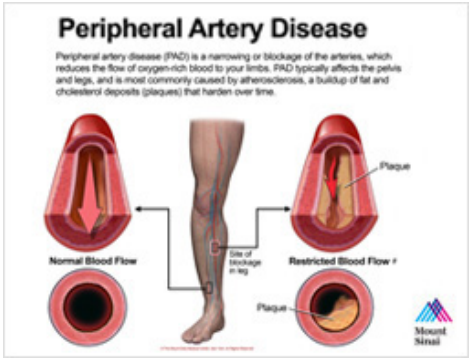


Fig 2. The natural history of patients with intermittent claudication (IC) treated with non-invasive management. *CV*, Cardiovascular; *MI*, myocardial infarction. Adapted from American College of Cardiology/Americal Heart Association guidelines.[43]

Besides Heightened Awareness as Clinicians, What Else Can We Do?

- Increase awareness in patient education !





PAD

Peripheral Arterial Disease

What is PAD?

PAD occurs when fatty deposits build up in the arteries and block blood flow, similar to coronary artery disease (CAD) and carotid artery disease (CVD).

PAD is different from CAD and CVD because it affects arteries leading from the legs and arms instead of the heart and brain.

Symptoms

- Pain, numbness, or weakness in legs
- Ulcers or sores on lef or foot that won't heal
- Cold legs or feet
- Aching pain in feet or toes while at rest
- Skin color changes in legs or feet

Who Suffers?

8 - 12 MILLION AMERICANS

20% OVER AGE 65

Men and Women are equally affected.

Higher risk of getting PAD if you are of African American or Hispanic decent.

Common Risk Factors

- History of Smoking
- Age 65 or Older
- Lack of Exercise
- High Cholesterol
- Obesity
- Diabetes

Screening for PAD

Screening for PAD is easy. We simply ask a few questions and take your blood pressure in both arms and legs.

If the pressure is lower in your legs, this could be a sign of PAD. We'll refer you to your primary care doctor for further testing.

Treatment Options

Many PAD symptoms can be controlled by making moderate lifestyle changes. For those with more serious conditions, angioplasty is one of several options.

Angioplasty is a minimally invasive procedure where an Interventional Radiologist uses a cathether to inflate a small balloon within your arteries to

Reduce Your Risk

Quit Smoking

Exercise Regularly

Eat Healthy

Lose Weight

Table 1. San Diego Claudication Questionnaire*

1. Do you get **pain, discomfort, or numbness** in your legs **when you walk**?

R	L	
1	1	.....Yes
2	2	.....No

2. Does this pain ever begin when you are **standing still** or **sitting**?

R	L	
1	1	.....Yes
2	2	.....No

3. In what part of the leg or buttock do you feel it?

	R	L	
(A) Includes calf/calves	1	1	.....Yes
	2	2	.....No
(B) Includes thigh/thighs	1	1	.....Yes
	2	2	.....No
(C) Includes buttock/buttocks	1	1	.....Yes
	2	2	.....No

4. Do you get it when you **walk uphill or hurry?**

R	L	
1	1	.....Yes
2	2	.....No
3	3	.....Never walk uphill or hurry

5. Do you get it if you walk at an **ordinary pace** on the level?

R	L	
1	1	.....Yes
2	2	.....No

6. Does the pain ever **disappear** while you are **still walking**?

R	L	
1	1	.....Yes
2	2	.....No

7. **What do you do** if you get this pain while you are walking?

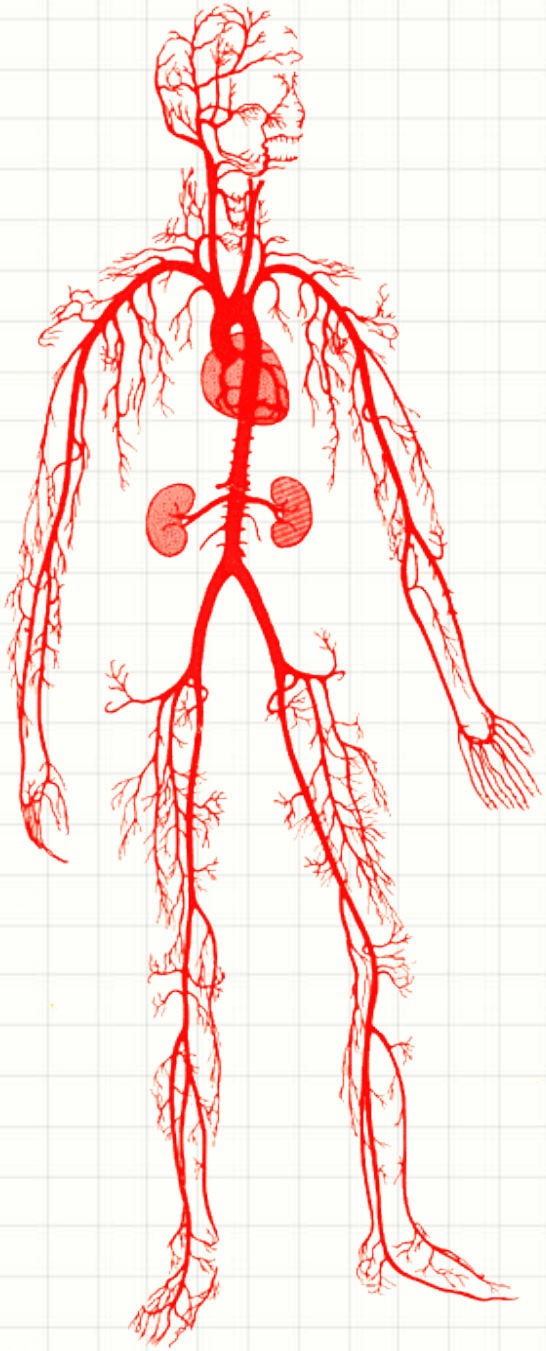
R	L	
1	1	.....Stop or slow down
2	2	.....Carry on

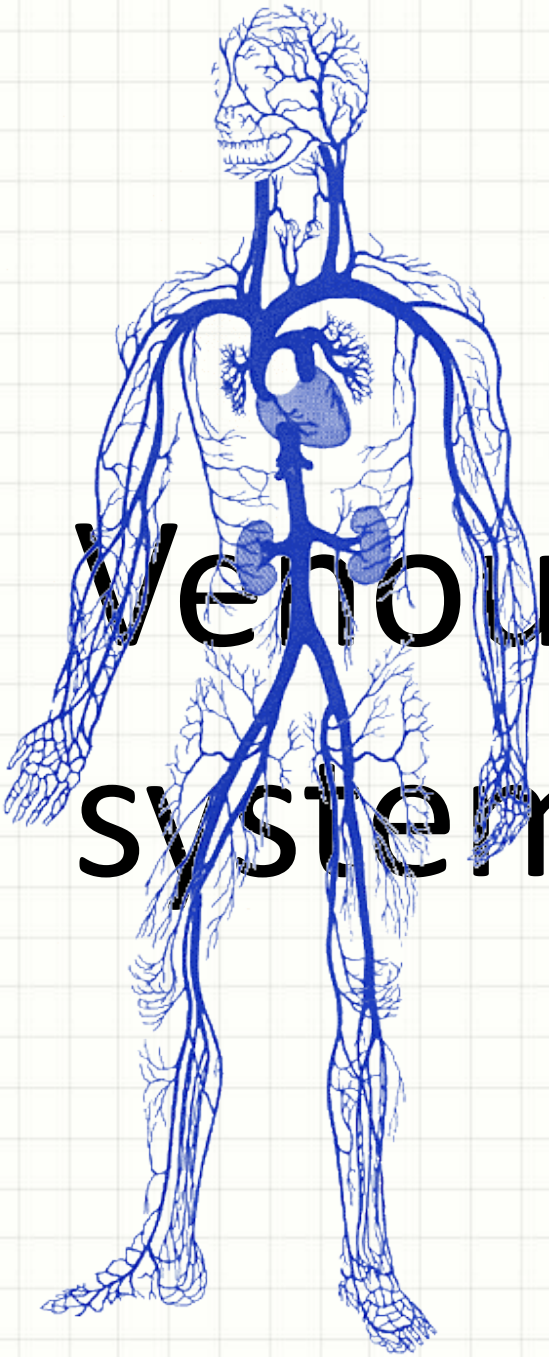
8. What happens to it if you **stand still**?

R	L	
1	1	.....Lessens or relieved
2	2	.....Unchanged

9. How **soon**?

R	L	
1	1	.....10 minutes or less
2	2	.....More than 10 minutes





Venous system

Spectrum of Venous Disorders

- Deep venous thrombosis
- Superficial thrombophlebitis
- Pulmonary embolism
- Post thrombotic syndrome
- Axillary-subclavian stenosis
- Varicose veins
- Venous insufficiency
- May Thurner syndrome
- Arteriovenous malformations
- Thoracic outlet syndrome

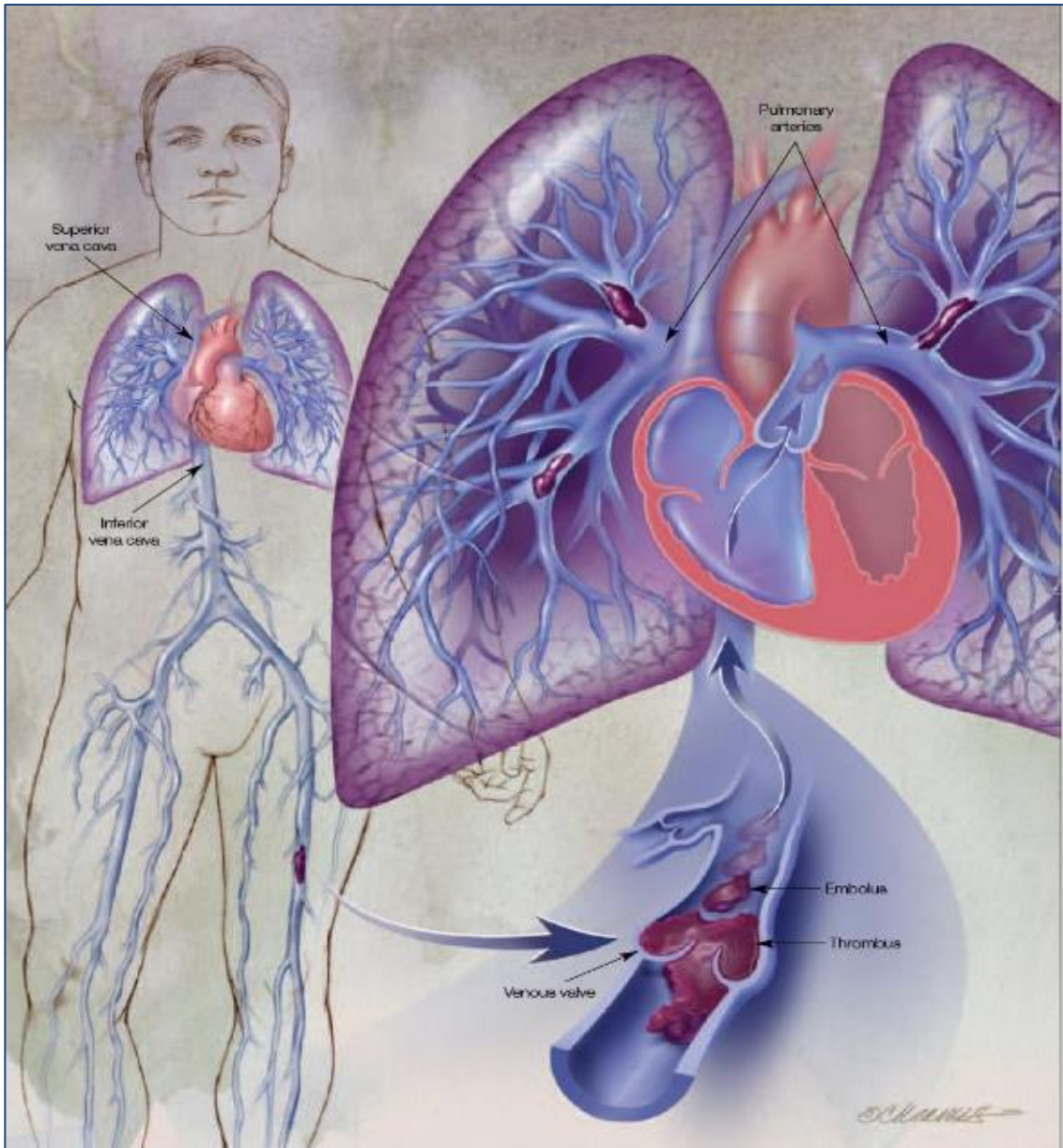
Venous Thromboembolic Disease

PE commonly originates from lower limb DVT (75%)

Annual US VTE Incidence 1-2 per 1,000

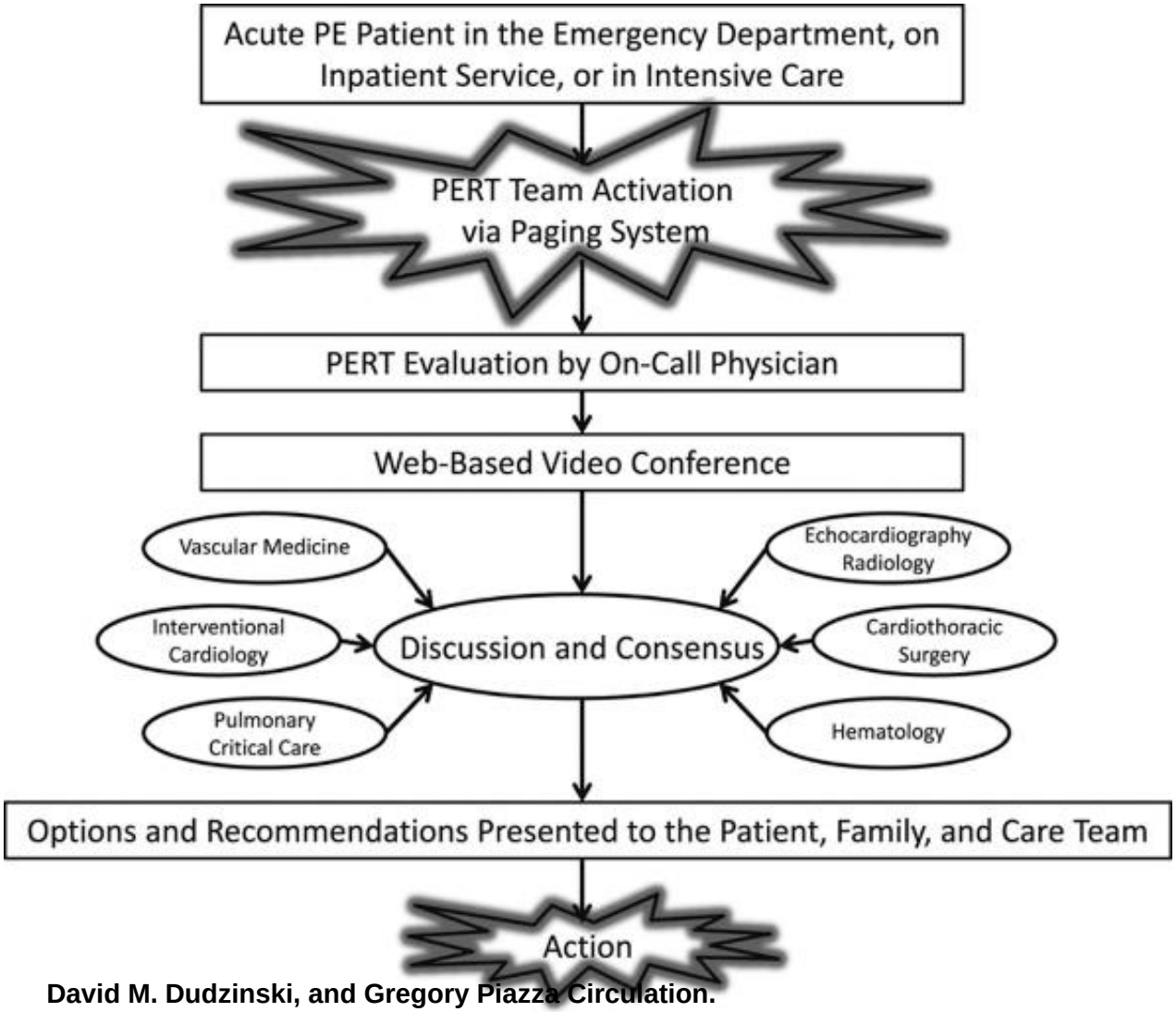
5-10% of all deaths among hospitalized patients

March is DVT/ Blood Clot Awareness Month!!!



Chest 2012;141:7S–47S.

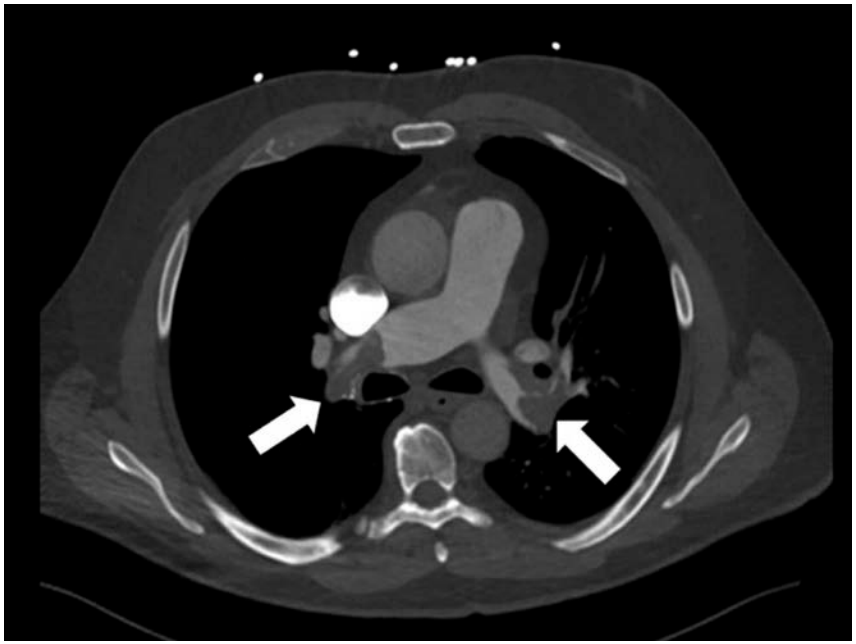
Pulmonary Embolism Response Team (PERT) “Lung Attack”

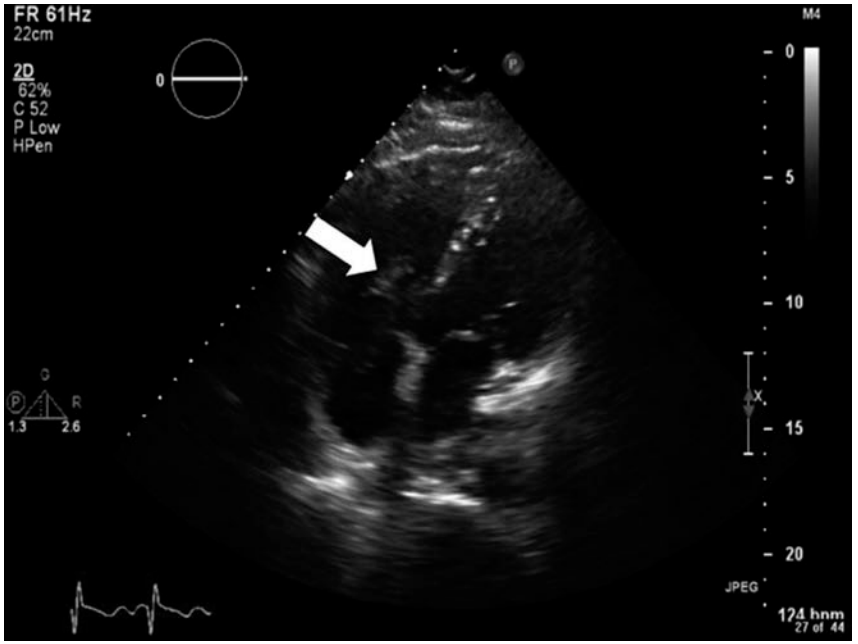


David M. Dudzinski, and Gregory Piazza Circulation. 2016;133:98-103

American Heart Association.

Multidisciplinary Team approach to Management of PE





The PERT team relies on multispecialty collaboration to help decide how to best treat patients.
Since there are several options available for patients with massive and sub-massive PE, it helps to have the expertise of the team to weigh in on decisions that may be difficult to make individually. The specialties involved may include interventional radiologists, cardiologists, surgeons, pulmonary medicine specialties,
emergency medicine, and intensive care specialists.

What Do These Patients Look Like?

ORIGINAL ARTICLE

Prevalence of Pulmonary Embolism among Patients Hospitalized for Syncope

Paolo Prandoni, M.D., Ph.D., Anthonie W.A. Lensing, M.D., Ph.D., Martin H. Prins, M.D., Ph.D., Maurizio Ciammaichella, M.D., Marica Perlati, M.D., Nicola Mumoli, M.D., Eugenio Bucherini, M.D., Adriana Visonà, M.D., Carlo Bova, M.D., Davide Imberti, M.D., Stefano Campostrini, Ph.D., and Sofia Barbar, M.D. for the PESIT Investigators*

October 20, 2016
N Engl J Med 2016; 375:1524-1531

RESULTS

A total of 560 patients (mean age, 76 years) were included in the study. A diagnosis of pulmonary embolism was ruled out in 330 of the 560 patients (58.9%) on the basis of the combination of a low pretest clinical probability of pulmonary embolism and negative D-dimer assay. Among the remaining 230 patients, pulmonary embolism was identified in 97 (42.2%). In the entire cohort, the prevalence of pulmonary embolism was 17.3% (95% confidence interval, 14.2 to 20.5). Evidence of an embolus in a main pulmonary or lobar artery or evidence of perfusion defects larger than 25% of the total area of both lungs was found in 61 patients. Pulmonary embolism was identified in 45 of the 355 patients (12.7%) who had an alternative explanation for syncope and in 52 of the 205 patients (25.4%) who did not.

CONCLUSIONS

Pulmonary embolism was identified in nearly one of every six patients hospitalized for a first episode of syncope. (Funded by the University of Padua; PESIT ClinicalTrials.gov number, NCT01797289.)

Approximate Risks of DVT in Hospitalized Patients*

Patient Group	DVT Prevalence, %
Medical patients	10-20
General surgery	15-40
Major gynecologic surgery	15-40
Major urologic surgery	15-40
Neurosurgery	15-40
Stroke	20-50
Hip or knee arthroplasty, HFS	40-60
Major trauma	40-80
SCI	60-80
Critical care patients	10-80

* Rates based on objective diagnostic screening for asymptomatic DVT in patients not receiving thromboprophylaxis

Risk Factors for Venous Thrombosis: Virchow's Triad

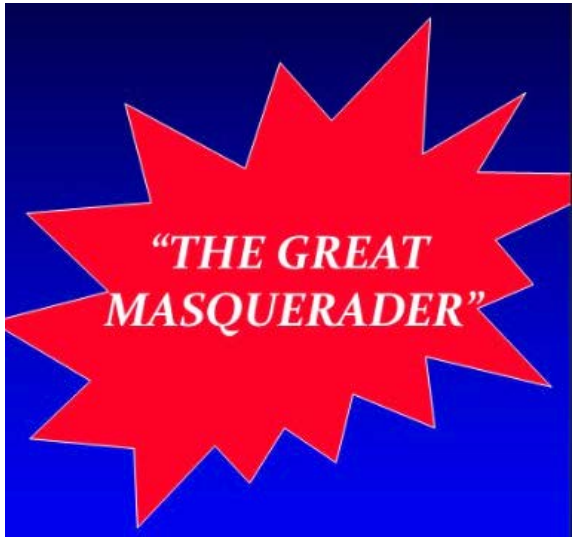
Stasis	Vessel wall injury	Hypercoagulability
• Obesity • Long travel • Immobility • Congestive heart failure	• Surgery • Injury/trauma • Personal history of VTE • Indwelling device	• Hormone replacement • Smoking • Pregnancy • Cancer • Family history of VTE

Recurrent Venous Thromboembolic Disease

RISK FACTOR	RATE OF RECURRENCE
SURGERY	3 % AT 5 YEARS
NON SURGICAL	15 % AT 5 YEARS
UNPROVOKED	30 % AT 5 YEARS
CANCER	15 % ANNUAL RISK

Symptoms of Venous Thrombosis

- Shortness of breath
- Chest pain
- Hemoptysis
- Syncope
- Arrhythmias



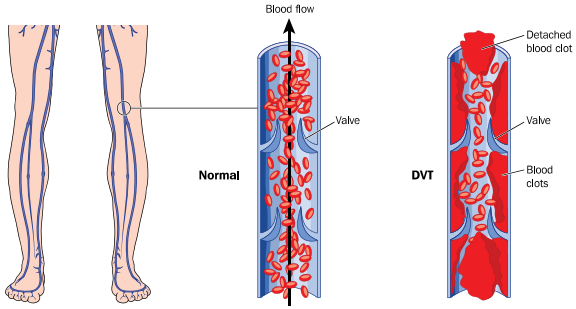
- Swelling in one or both extremities
- Pain or tenderness in one or both extremities
- Warmth
- Redness or purple discoloration

Phlegmasia Cerulea Dolens

- Occlusion of both deep and superficial venous system. Fluid sequestrations, significant edema, agonizing pain, cyanosis, bullae. Compartment syndrome, acute ischemia

Oklahoma State University Medical Center

Venous Thromboembolism Task Force and Acute VTE



Our goal is to prevent life threatening progression to PE and reduce the disabling post thrombotic leg syndrome.

Symptomatic Proximal DVT?

For example:

- Symptomatic iliac, common femoral, or femoral DVT
- Limb threat (Phlegmasia Cerulea Dolens)
- Ideally less than 14 days of symptoms

Call 918-599-5566 to activate task force/transfer

Step 1:

Confirm no contraindications for anticoagulation

- Give IV Heparin or SC Lovenox before transfer

Step 2:

Urgent Vascular consultation with Cardiology and Interventional Radiology

744 West 9th Street, Tulsa, OK 74127
918-599-5566 | Fax 918-599-4092 | osumc.com

Post Thrombotic Syndrome:

Patients with iliofemoral DVT have 2-year PTS rates of

≥ 50%, despite anticoagulation

< Previous Article | Volume 379, No. 9810, p31–38, 7 January 2012 | Next Article

Articles

Long-term outcome after additional catheter-directed thrombolysis versus standard treatment for acute iliofemoral deep vein thrombosis (the CaVenT study): a randomised controlled trial

Tone Enden, MD, Ylva Haig, MD, Prof Nils-Einar Kløw, MD, Carl-Erik Slagsvold, MD, Prof Leiv Sandvik, PhD, Waleed Ghanima, MD, Geir Hafsahl, MD, Pål Andre Holme, MD, Lars Olaf Holmen, MD, Anne Mette Njaastad, MD, Gunnar Sandbæk, MD, Prof Per Morten Sandset, MD on behalf of the CaVenT Study Group

Published: 13 December 2011

jth journal of thrombosis and haemostasis™ | ISTH International Society on Thrombosis and Haemostasis

Review Article | Free Access

The postthrombotic syndrome: current evidence and future challenges

A. Rabinovich, S. R. Kahn

First published: 18 November 2016 | https://doi.org/10.1111/jth.13569 | Cited by:8

Diagnostics with D-dimer and Wells score

J Thromb Haemost. 2017 Apr;15(4):678-684. doi: 10.1111/jth.13630. Epub 2017 Feb 16.

The original and simplified Wells rules and age-adjusted D-dimer testing to rule out pulmonary embolism: an individual patient data meta-analysis.

van Es N[1], Kraaijpoel N[1], Klok FA[2], Huisman MV[2], Den Exter PL[2], Mos IC[2], Galipienzo J[3], Büller HR[1], Bossuyt PM[4].

⊕ Author information

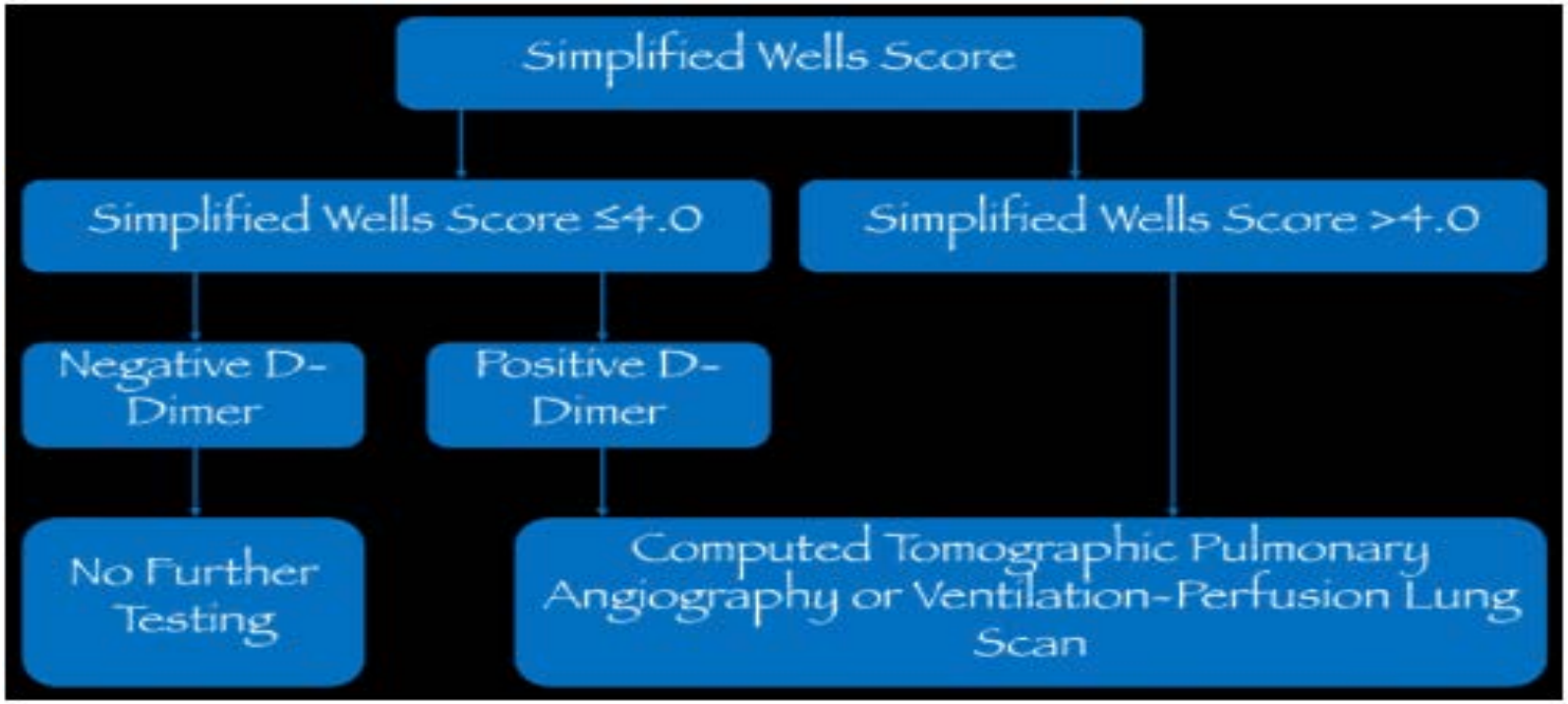
Abstract

Essentials Evidence for the simplified Wells rule in ruling out acute pulmonary embolism (PE) is scarce. This was a post-hoc analysis on data from 6 studies comprising 7268 patients with suspected PE. The simplified Wells rule combined with age-adjusted D-dimer testing may safely rule out PE. Given its ease of use, the simplified Wells rule is to be preferred over the original Wells rule.

SUMMARY: Background The Wells score and D-dimer testing can safely rule out pulmonary embolism (PE). A simplification of the Wells score has been proposed to improve clinical applicability, but evidence on its performance is scarce. Objectives To compare the performances of the original and simplified Wells scores alone and in combination with age-adjusted D-dimer testing. Methods Individual patient data from 7268 patients with suspected PE enrolled in six management studies were used to evaluate the discriminatory performances of the original and simplified Wells scores. The efficiency and failure rate of the dichotomized original and simplified scores combined with age-adjusted D-dimer testing were compared by use of a one-stage random effects meta-analysis. Efficiency was defined as the proportion of patients in whom PE could be considered to be excluded on the basis of a 'PE unlikely' Wells score and a negative age-adjusted D-dimer test result. Failure rate was defined as the proportion of patients with symptomatic venous thromboembolism during a 3-month follow-up. Results The discriminatory performances of the original and simplified Wells scores were comparable (c-statistic 0.73 [95% confidence interval (CI) 0.72-0.75] versus 0.72 [95% CI 0.70-0.73]). When combined with age-adjusted D-dimer testing, the original and simplified Wells rules had comparable efficiency (3% [95% CI 25-42%] versus 30% [95% CI 21-40%]) and failure rates (0.9% [95% CI 0.6-1.5%] versus 0.8% [95% CI 0.5-1.3%]). Conclusion The original and simplified Wells rules combined with age-adjusted D-dimer testing have similar performances in ruling out PE. Given its ease of use in clinical practice, the simplified Wells rule is to be preferred.

Simplified Wells Score

Variable	Points
Clinical Signs or Symptoms of Deep-Vein Thrombosis	3.0
Alternative Diagnosis Less Likely Than Pulmonary Embolism	3.0
Heart Rate >100 bpm	1.5
Immobilization or Surgery in the Previous 4 Weeks	1.5
Previous Venous Thromboembolism	1.5
Hemoptysis	1.0
Active Cancer	1.0
A total Score of ≤4.0 Indicates that PE is Unlikely, and a Score >4.0 Indicates that a PE is Likely	

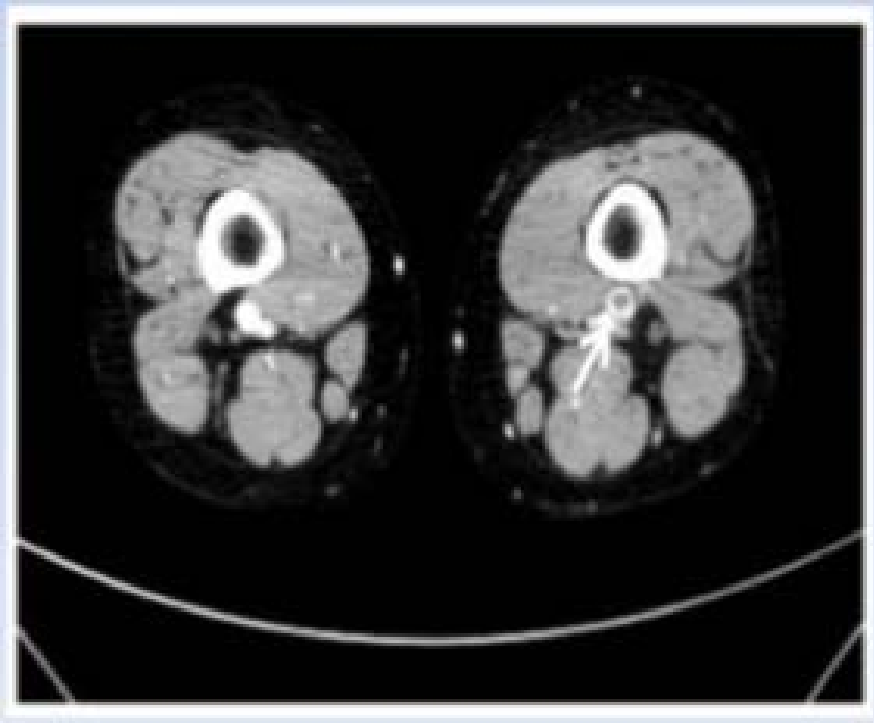


Venous Doppler US
95% sensitivity above the knee 98% specificity

Direct signs	Indirect signs
Intramural thrombus	Loss of phasicity : Proximal thrombosis
Incompressibility	
+ Vein diameter	
No flow in pulse Doppler	Loss of augmentation: Distal thrombosis
No flow in color Doppler	

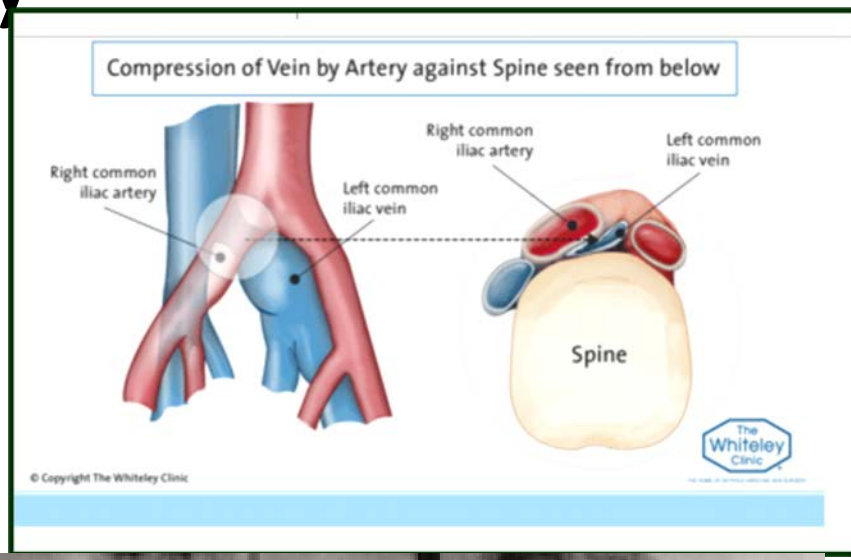
Be sure to pay attention to comments of quality of study!

CT or MR Venogram
specific timing of injection
Sensitivity of 94-98% and specificity 100%



Iliac Vein Compression or May Thurner Anatomy

- Recurrent swelling in legs more commonly left more than right
- DVT occurs 5 times more frequent in the left leg
- CT Venogram
- Invasive angiogram with intravascular US



CHEST

Antithrombotic Therapy for VTE Disease

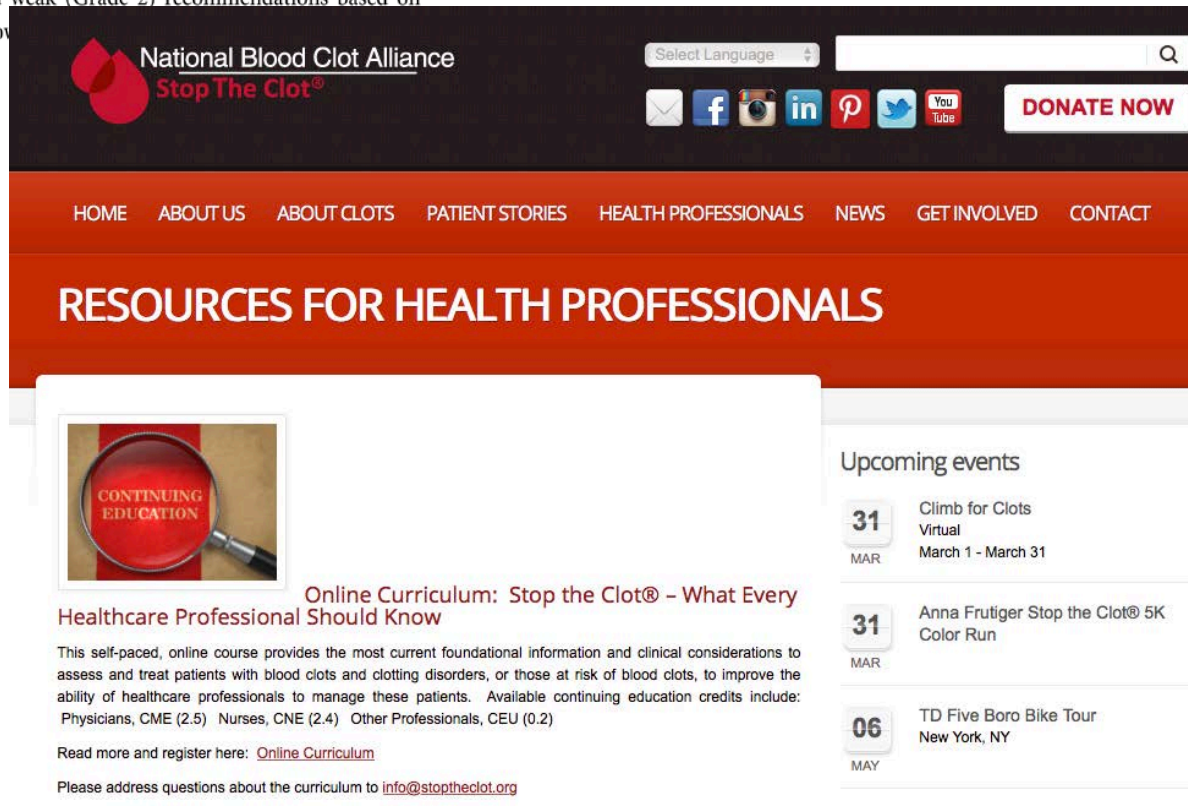
CHEST Guideline and Expert Panel Report

Clive Kearon, MD, PhD; Elie A. Akl, MD, MPH, PhD; Joseph Ornelas, PhD; Allen Blaivas, DO, FCCP; David Jimenez, MD, PhD, FCCP; Henri Bounameaux, MD; Menno Huisman, MD, PhD; Christopher S. King, MD, FCCP; Timothy A. Morris, MD, FCCP; Namita Sood, MD, FCCP; Scott M. Stevens, MD; Janine R. E. Vintch, MD, FCCP; Philip Wells, MD; Scott C. Woller, MD; and COL Lisa Moores, MD, FCCP

PODCAST

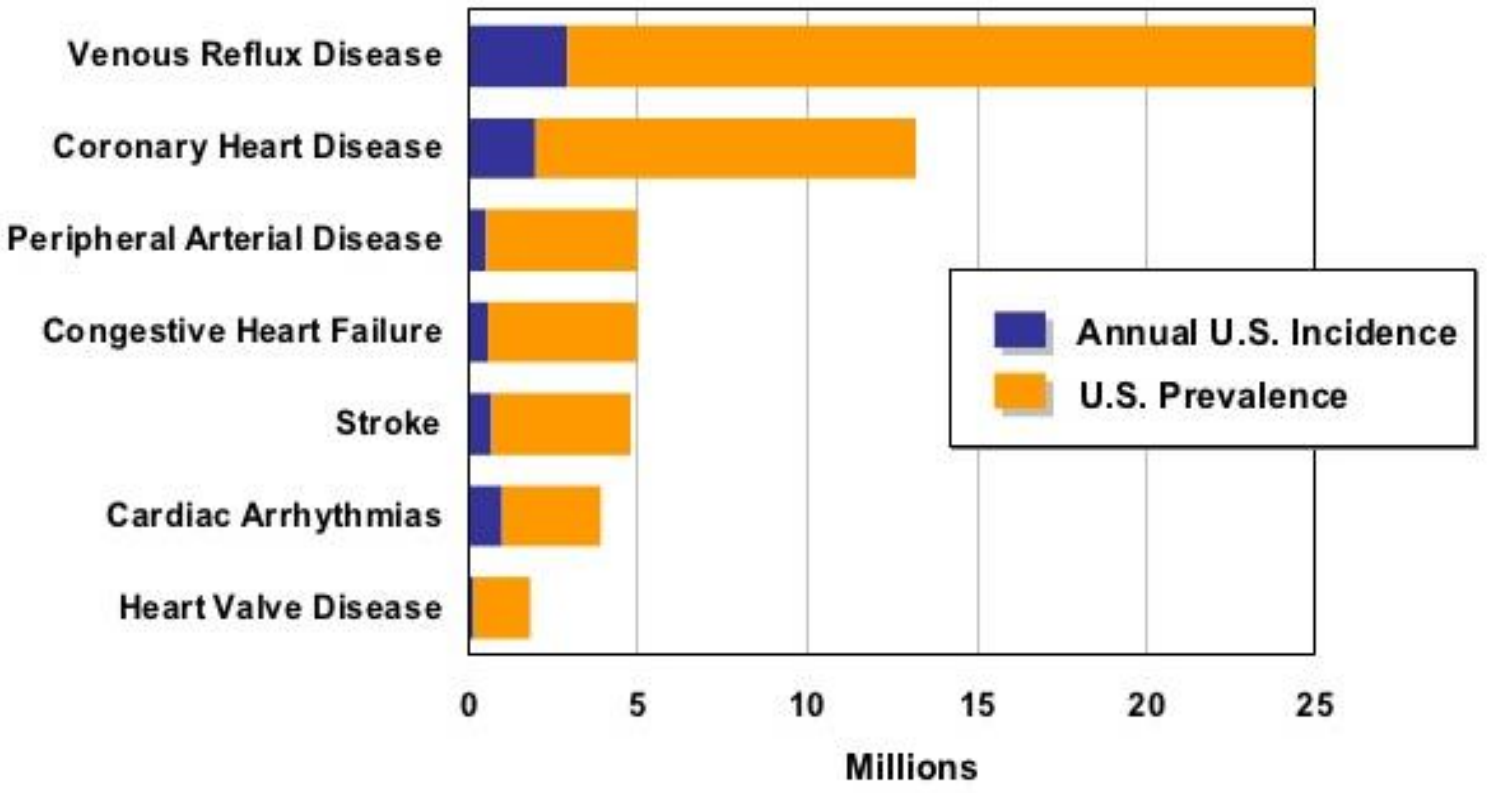
BACKGROUND: We update recommendations on 12 topics that were in the 9th edition of these guidelines, and address 3 new topics.

METHODS: We generate strong (Grade 1) and weak (Grade 2) recommendations based on high- (Grade A), moderate- (Grade B), and lo



Prevalence of Venous Reflux Disease

Venous reflux disease is 2x more prevalent than coronary heart disease (CHD) and 5x more prevalent than peripheral arterial disease (PAD)[1]

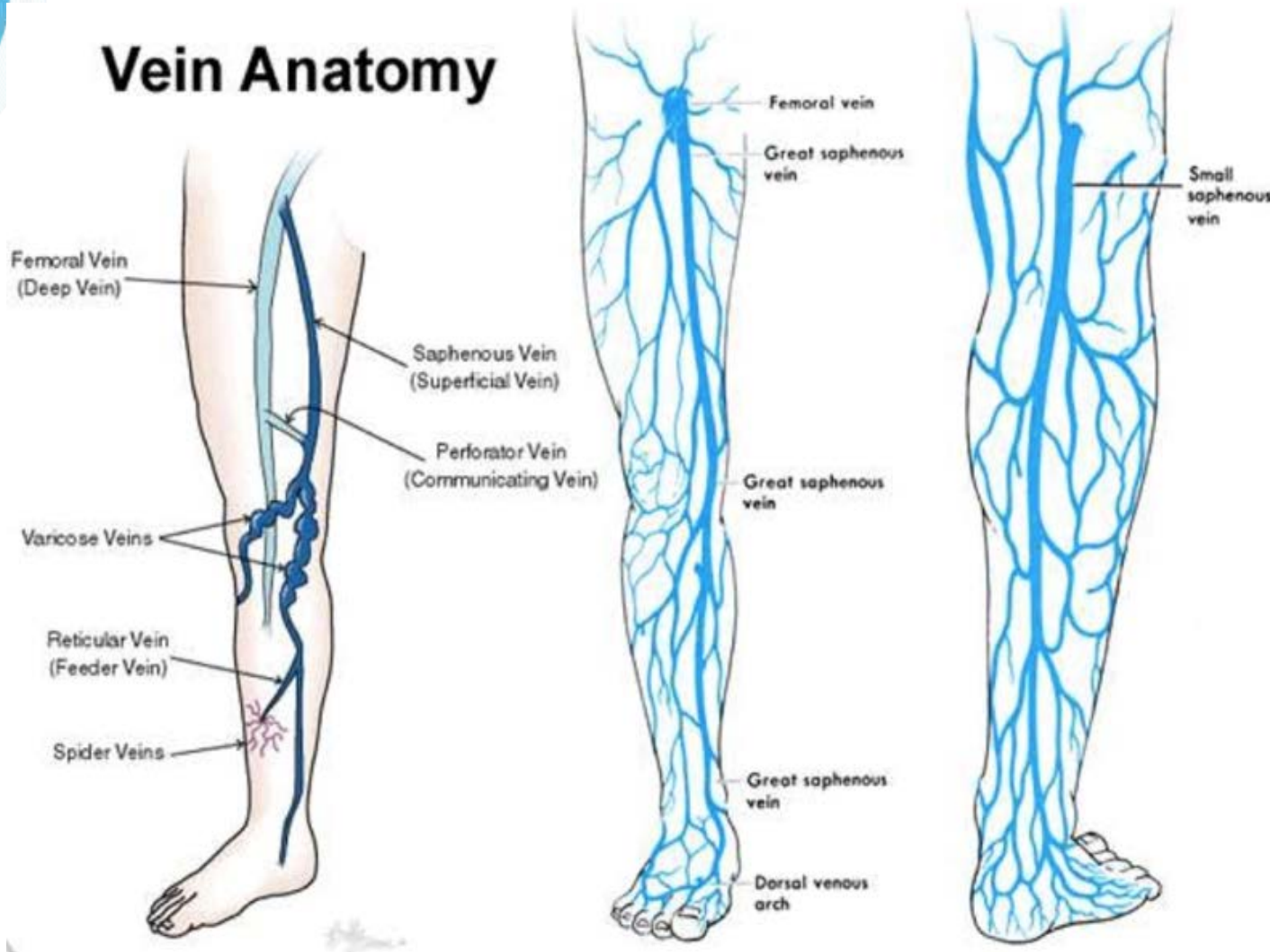


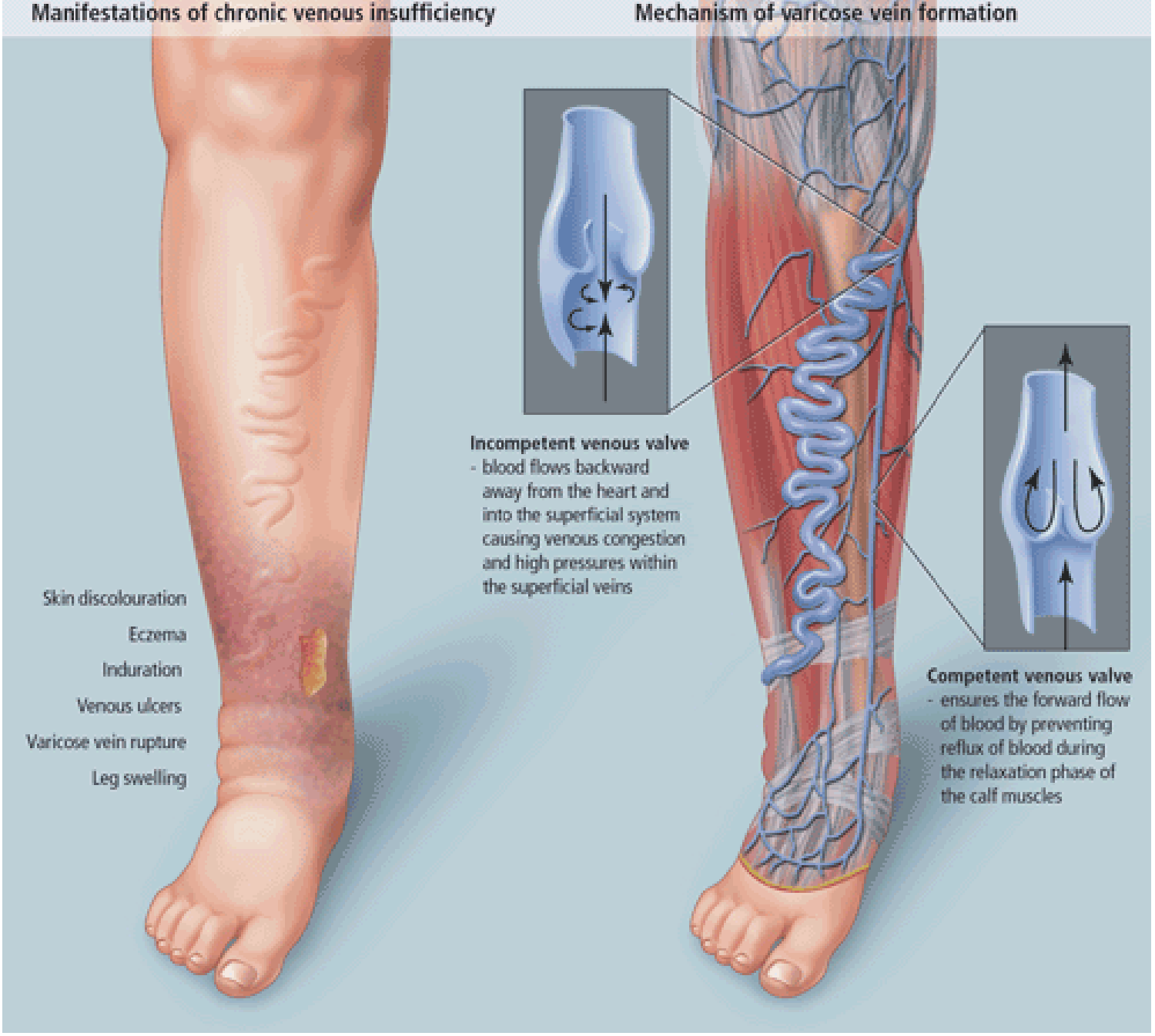
Physical Findings of Venous Disease
Edema

Diffuse red-brown discoloration representing deep dermal deposits of hemosiderin from degraded extravasated erythrocytes

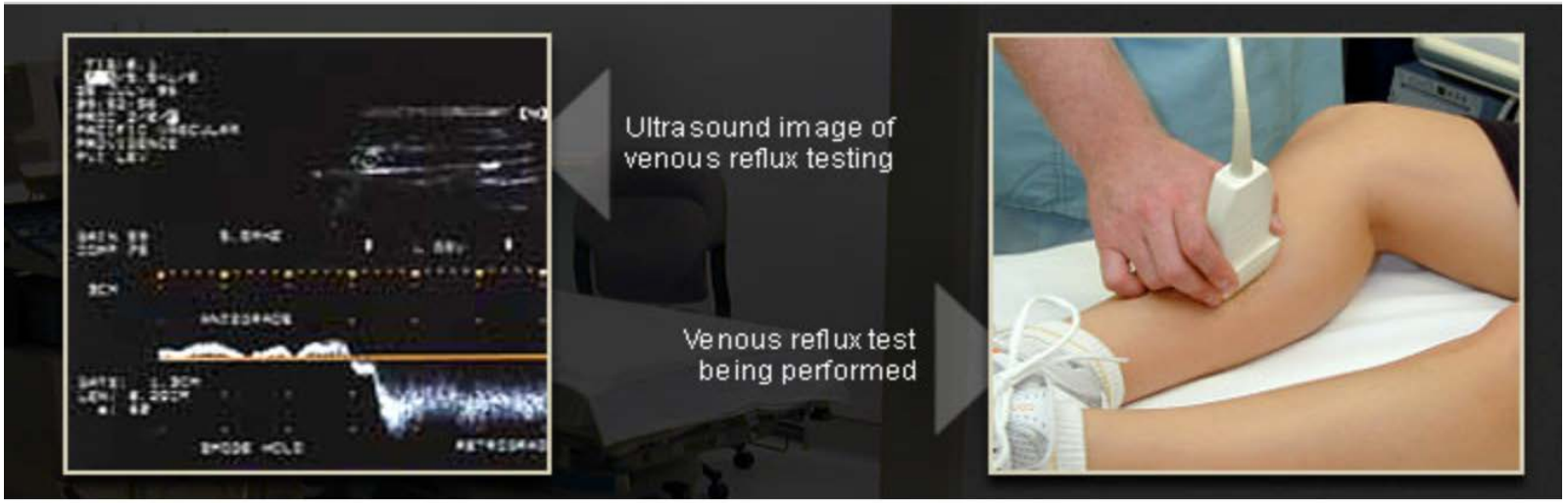
Corona phlebectatica
Abnormally dilated veins around the ankle

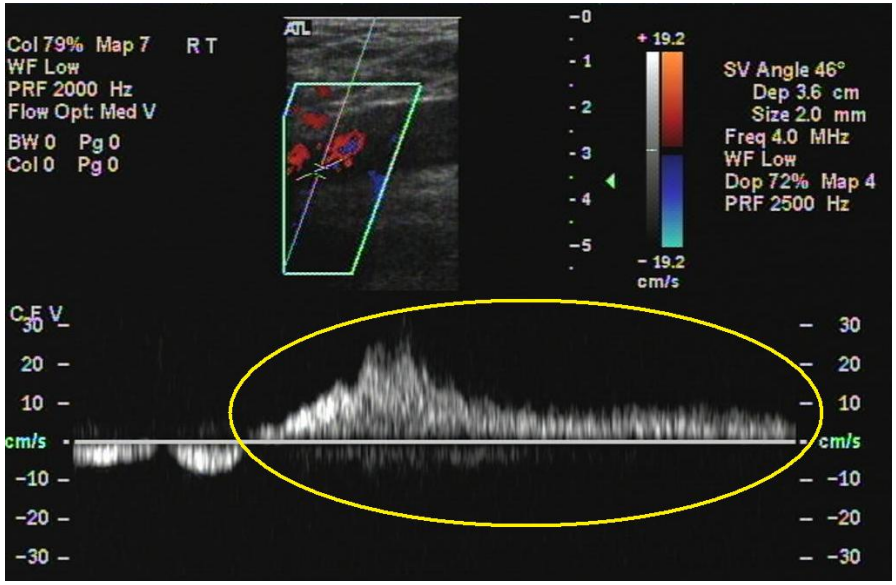
Superficial Venous Anatomy




Manifestations of chronic venous insufficiency
Skin discolouration
Eczema
Induration
Venous ulcers
Varicose vein rupture
Leg swelling
Mechanism of varicose vein formation
Incompetent venous valve
- blood flows backward away from the heart and into the superficial system causing venous congestion and high pressures within the superficial veins
Competent venous valve
- ensures the forward flow of blood by preventing reflux of blood during the relaxation phase of the calf muscles

Diagnostics of Venous Insufficiency Dependent on patient and sonographer





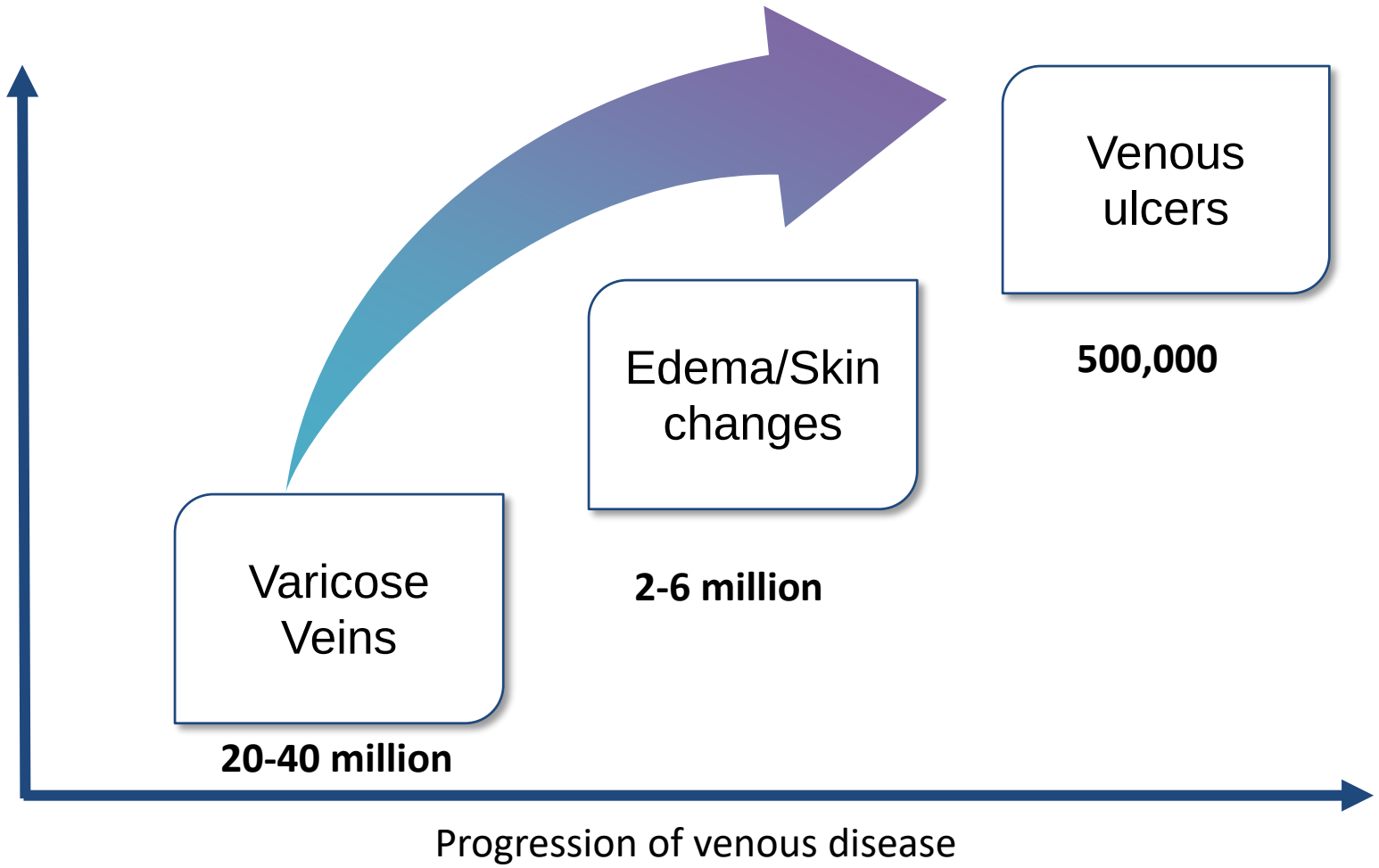
Symptoms of Venous Insufficiency

- Leg achiness, throbbing, or cramping
- Heavy feeling
- Burning or itching of the skin
- Leg or ankle swelling
- Skin discoloration or texture changes
- Varicose veins
- Restless legs
- Open wounds or sores

Risk Factors for Development of Venous Insufficiency

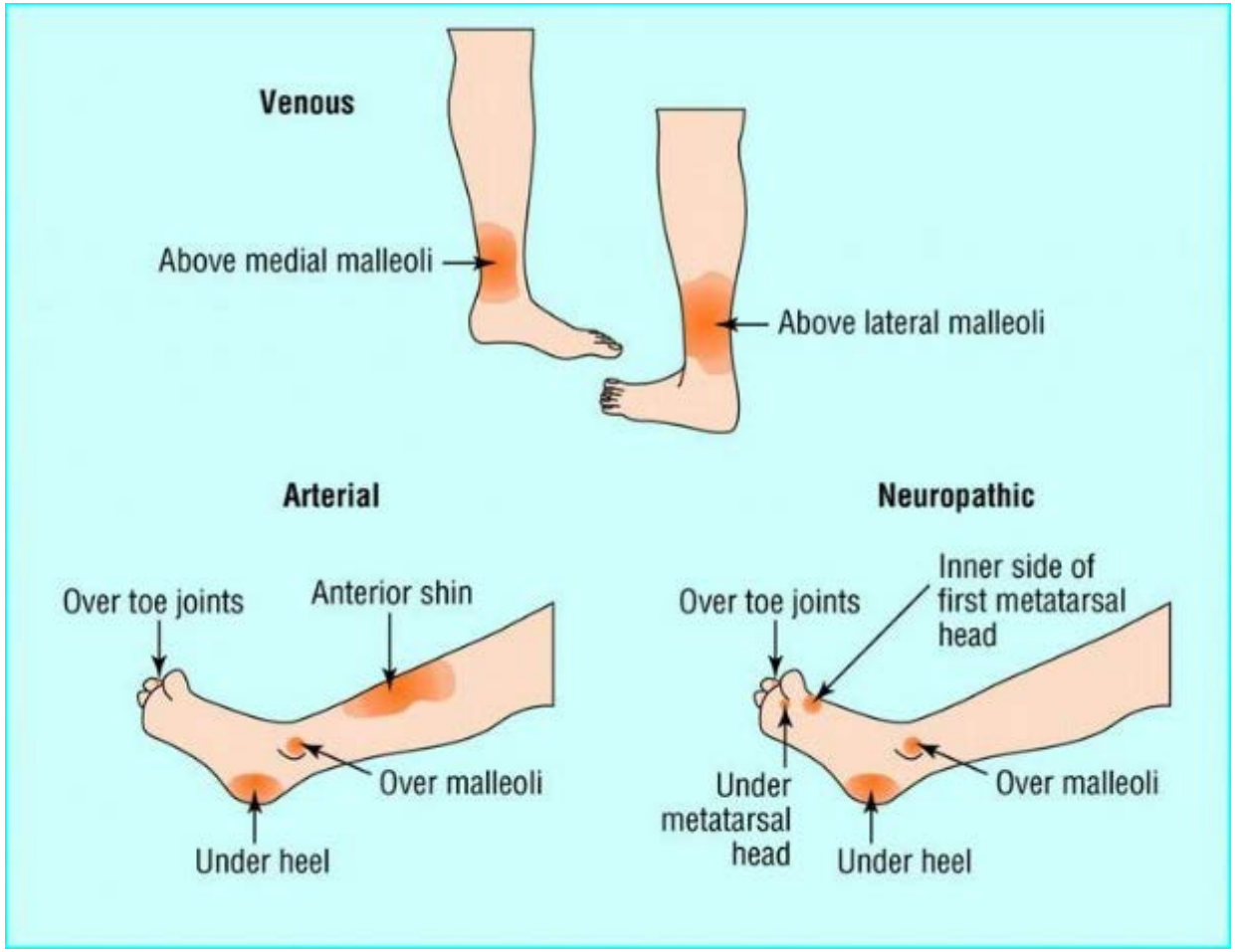
- Gender
- Age
- Heredity
- Pregnancy
- Standing occupation
- Obesity
- Prior injury or surgery
- Prior DVT
- Sedentary lifestyle

Spectrum of Venous Insufficiency



Venous Ulcers

Clinical pearls for ulcers



Make Your Patient Pull up Their Pants, Lift Their Skirt, Put Them In a Gown Become more “high touch” instead of “high-tech”