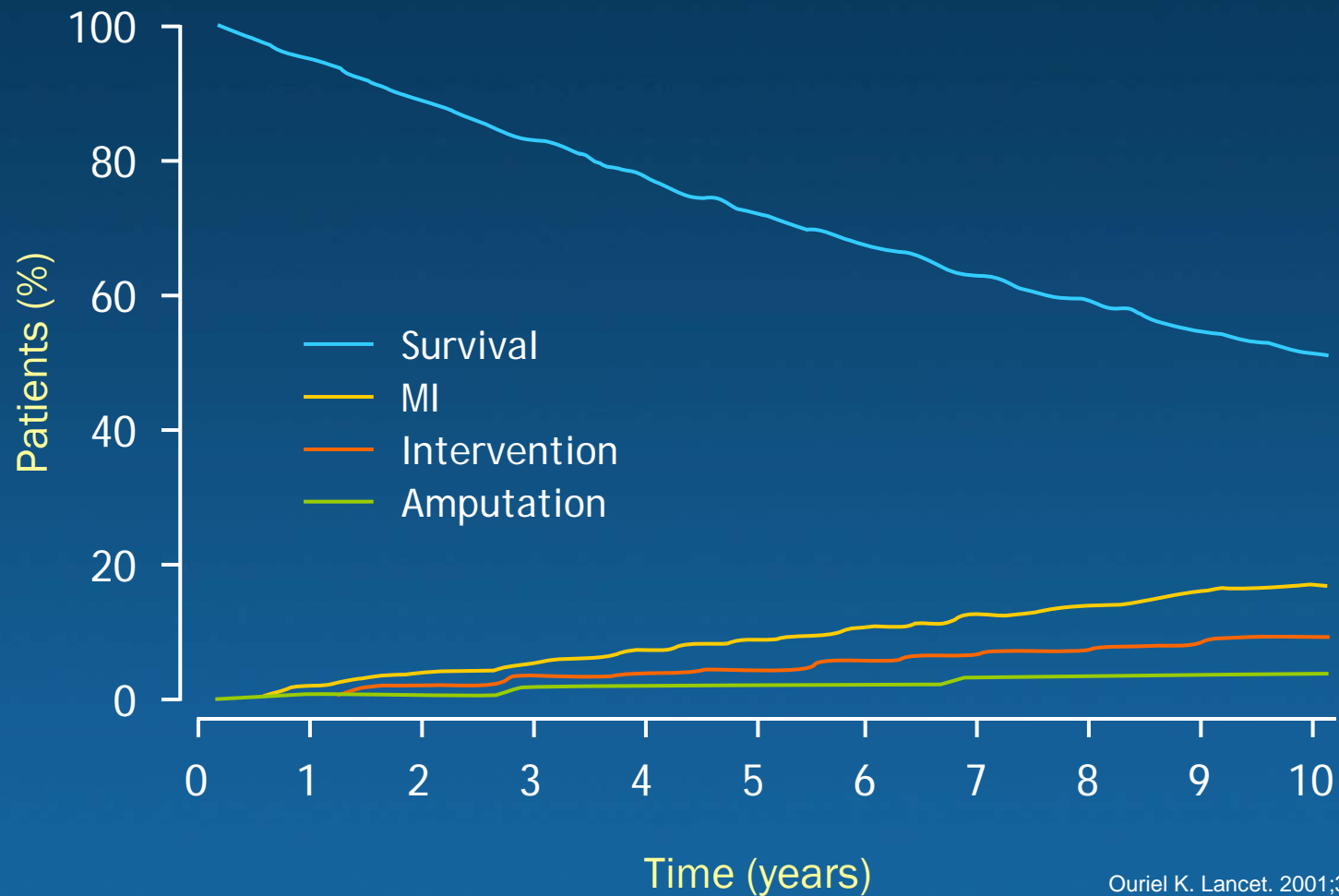


Peripheral Arterial Disease: Screening, Evaluation and Management

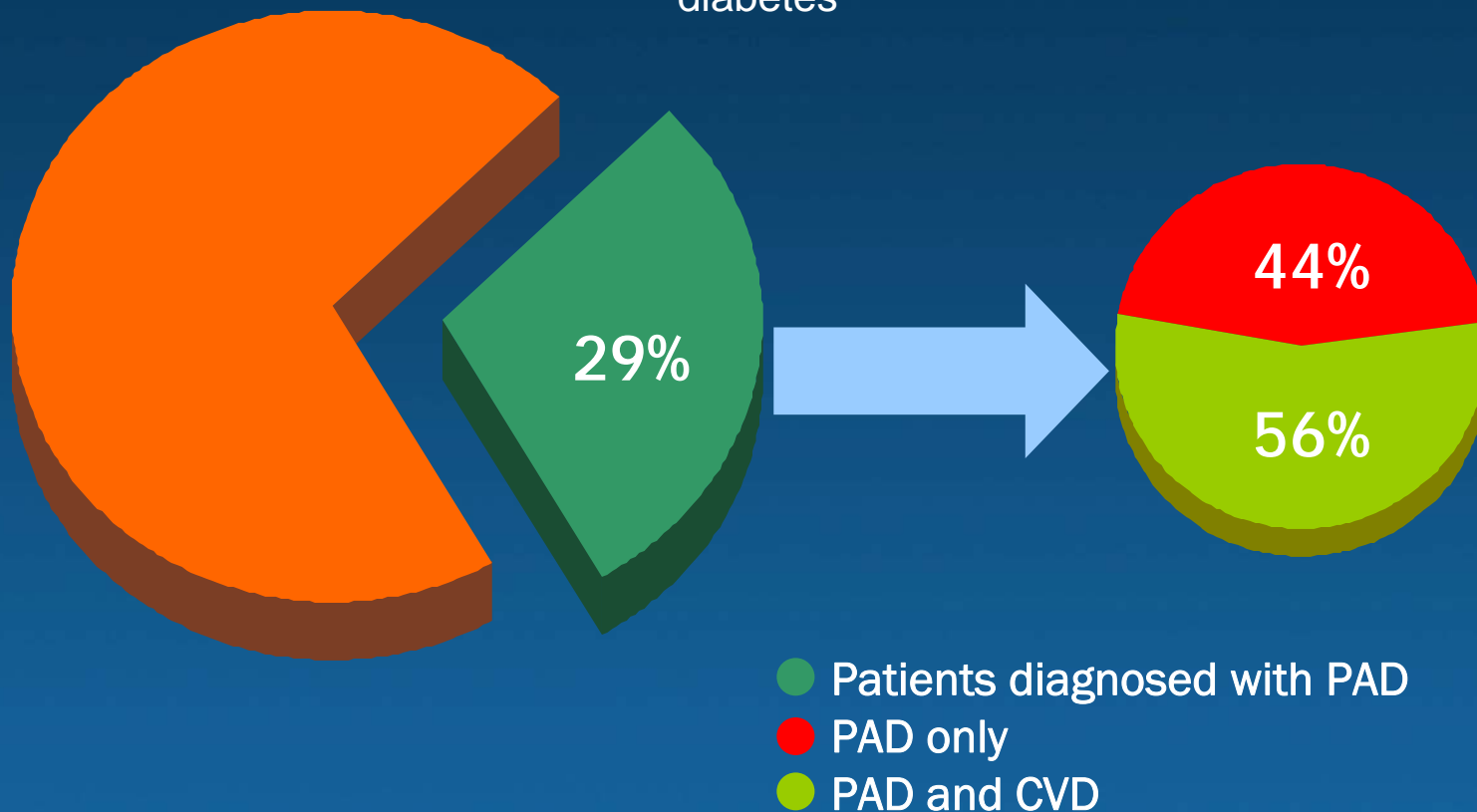
Mitchel Sklar, MD, FACC, FSCAI
Cardiovascular Associates of R.I.

Natural History of Intermittent Claudication/PAD: *Peripheral to what?*

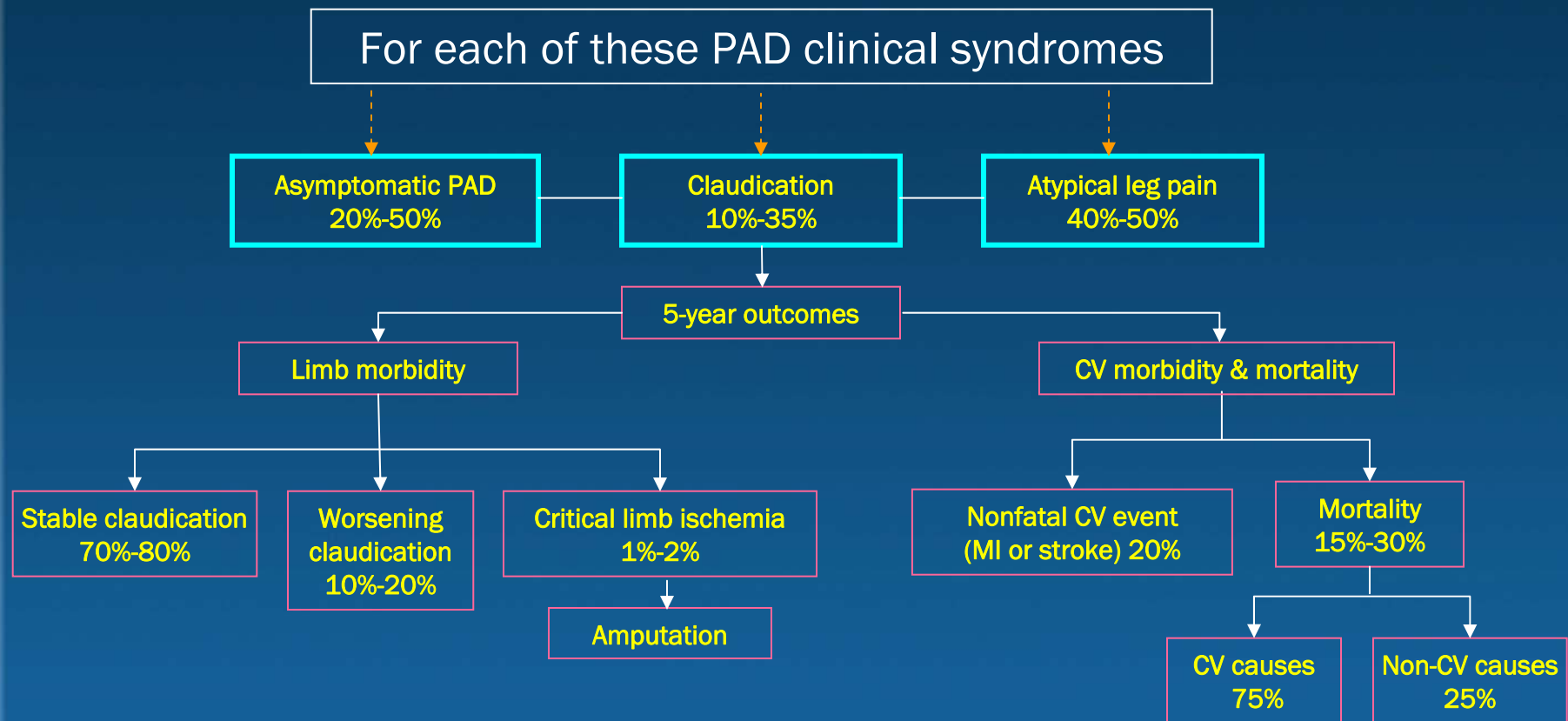


PARTNERS Trial: PAD and CAD— *there if you look for it*

29% of Patients in a Target Population Were Diagnosed With PAD Using An Office-Based ABI done on all patients over 70 or over 50 with smoking hx or diabetes



Natural History of Atherosclerotic Lower Extremity PAD



“At Risk” and Presentations for Lower Extremity PAD

- Age less than 50 years with diabetes, and one additional risk factor (e.g., smoking, dyslipidemia, hypertension, CRP)
- Age 50 to 69 years and history of smoking or diabetes
- Age 70 years and older
- Leg symptoms with exertion (suggestive of claudication) or ischemic rest pain
- Abnormal lower extremity pulse examination
- Known atherosclerotic coronary, carotid, or renal artery disease
- Asymptomatic
- Intermittent claudication
 - Discomfort, ache, cramping in leg with exercise—resolves with rest
- Functional impairment
 - Slow walking speed, gait disorder, imbalance
- Rest pain
 - Pain or paresthesias in foot or toes, worsened by leg elevation and improved by dependency
- Ischemic ulceration and gangrene

Claudication vs. Pseudoclaudication

	Claudication	Pseudoclaudication
Characteristic of discomfort	Cramping, tightness, aching, fatigue	Same as claudication plus tingling, burning, numbness
Location of discomfort	Buttock, hip, thigh, calf, foot	Same as claudication
Exercise-induced	Yes	Variable
Distance	Consistent	Variable
Occurs with standing	No	Yes
Action for relief	Stand	Sit, change position
Time to relief	<5 minutes	≤30 minutes

The First Tool to Establish the PAD Diagnosis: *Don't let the shoe come between you and a diagnosis*

Pulse intensity should be assessed and should be recorded numerically as follows:

- 0, absent
- 1, diminished
- 2, normal
- 3, bounding

- Bilateral UE BP's
- Aorta, carotid and femoral for mass or bruit
- Pedal exam for pulse, lesions or elevation pallor



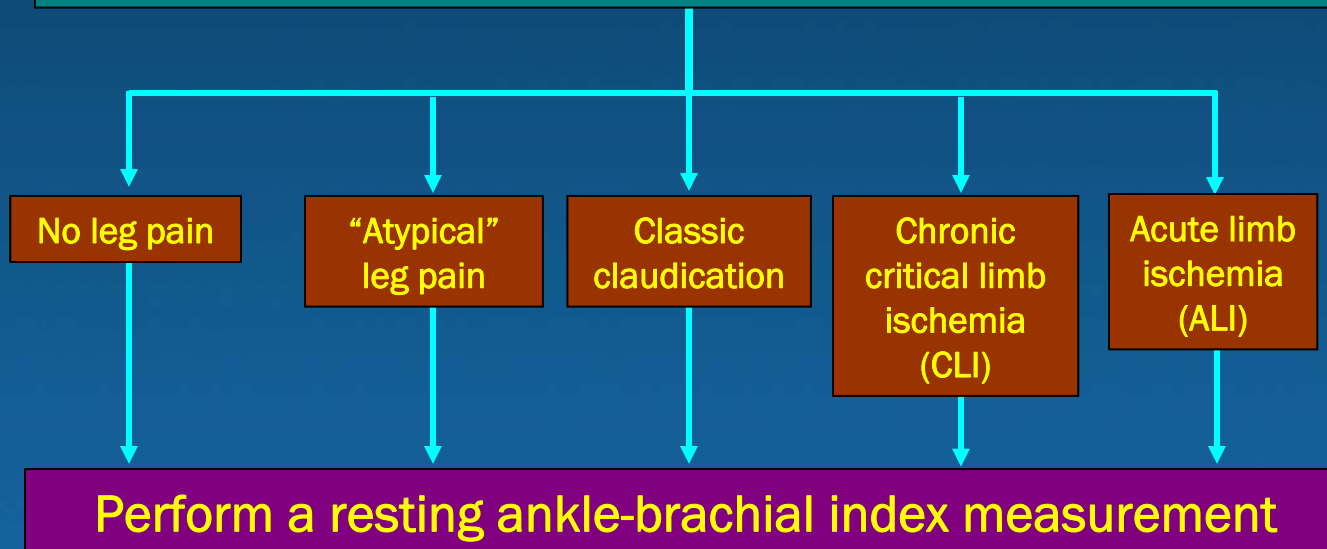
ACC/AHA Guideline for the Diagnosis of PAD

Recognizing the “at risk” groups leads to recognition of the five main PAD clinical syndromes:

Obtain history of walking impairment and/or limb ischemic symptoms:

Obtain a vascular review of symptoms:

- Leg discomfort with exertion
- Leg pain at rest; non-healing wound; gangrene



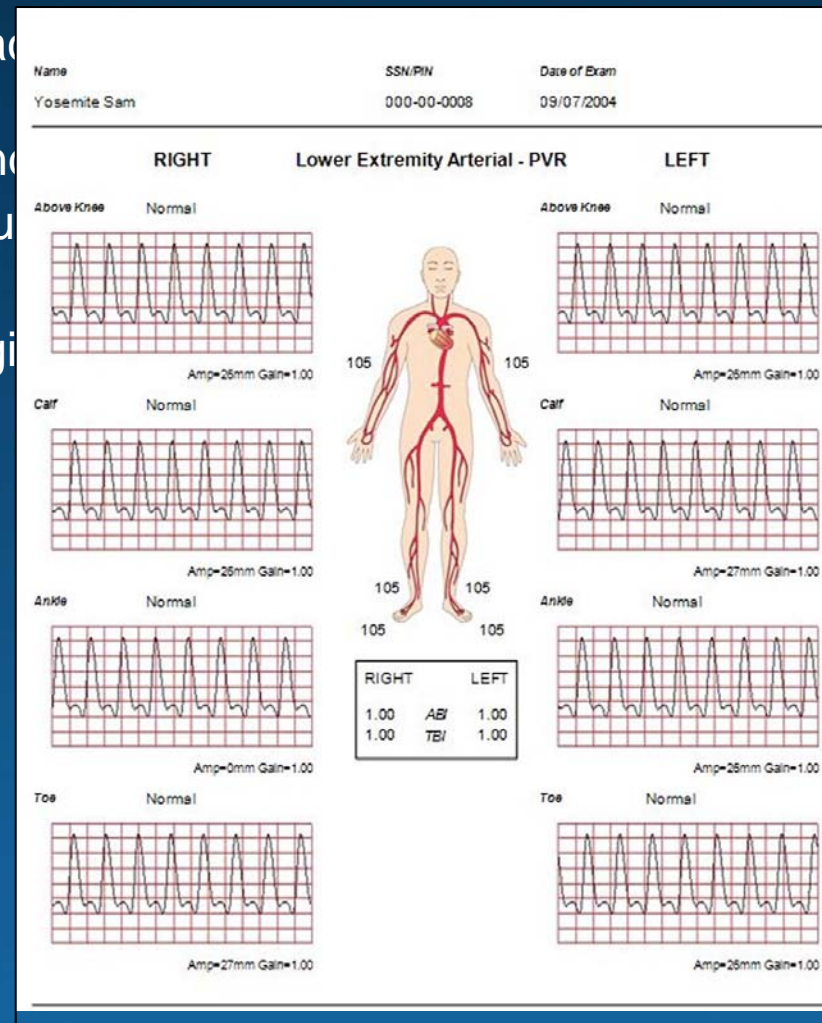
Interpreting the Ankle-Brachial Index

- Incompressible arteries (elderly patients, patients with diabetes, renal failure, etc.)
- Resting ABI may be insensitive for detecting mild aorto-iliac occlusive disease
- Not designed to define degree of functional limitation
- Normal resting values in symptomatic patients may become abnormal after exercise
- “Non-compressible” pedal arteries is a physiologic term and such arteries need not be “calcified”
- Sensitivity/specificity 95-99%

ABI	Interpretation
1.00 – 1.29	Normal
0.91 – 0.99	Borderline
0.41 – 0.90	Mild-to-moderate
≤0.40	Severe
≥1.30	Noncompressible

Non-invasive Vascular Study: “If you don’t take the temperature, you can’t find the fever”

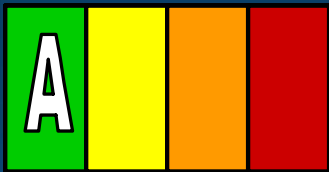
- Ankle-Brachial Index (ABI), Toe-Brachial Index (TBI) Recording (PVR) device
 - Measures arterial blood flow, and
- Twenty (20) minute non-invasive study
- Training in less than one day
- Minimum requirements of technology
 - Can take a blood pressure
 - Find a pulse
 - Log onto a computer
- Follow-up intervention/surgery
- Covered by insurance
- Generates report



Noninvasive Imaging Tests

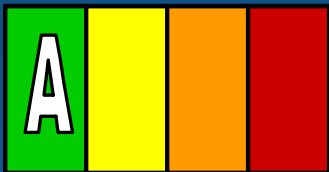
Duplex Ultrasound

I IIa IIb III



Duplex ultrasound of the extremities is useful to diagnose the anatomic location and degree of stenosis of PAD.

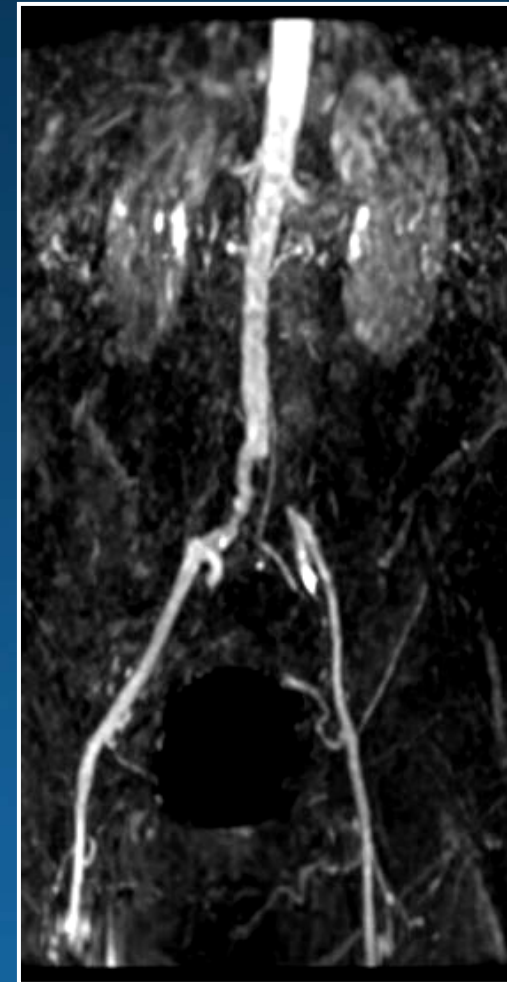
I IIa IIb III



Duplex ultrasound is recommended for routine surveillance after femoral-popliteal or femoral-tibial-pedal bypass with a venous conduit. minimum surveillance intervals are approximately 3,6, and 12 months, and then yearly after graft placement.

Magnetic Resonance Angiography (MRA)

- MRA has virtually replaced contrast arteriography for PAD diagnosis
- No ionizing radiation and noniodine-based intravenous contrast medium
- Use to plan intervention/revascularization
- ~10% of patients cannot utilize MRA because of:
 - Claustrophobia
 - Pacemaker/implantable cardioverter-defibrillator
 - Obesity
- Gadolinium use in individuals with an eGFR <60 mL/min has been associated with nephrogenic systemic fibrosis (NSF)/nephrogenic fibrosing dermopathy

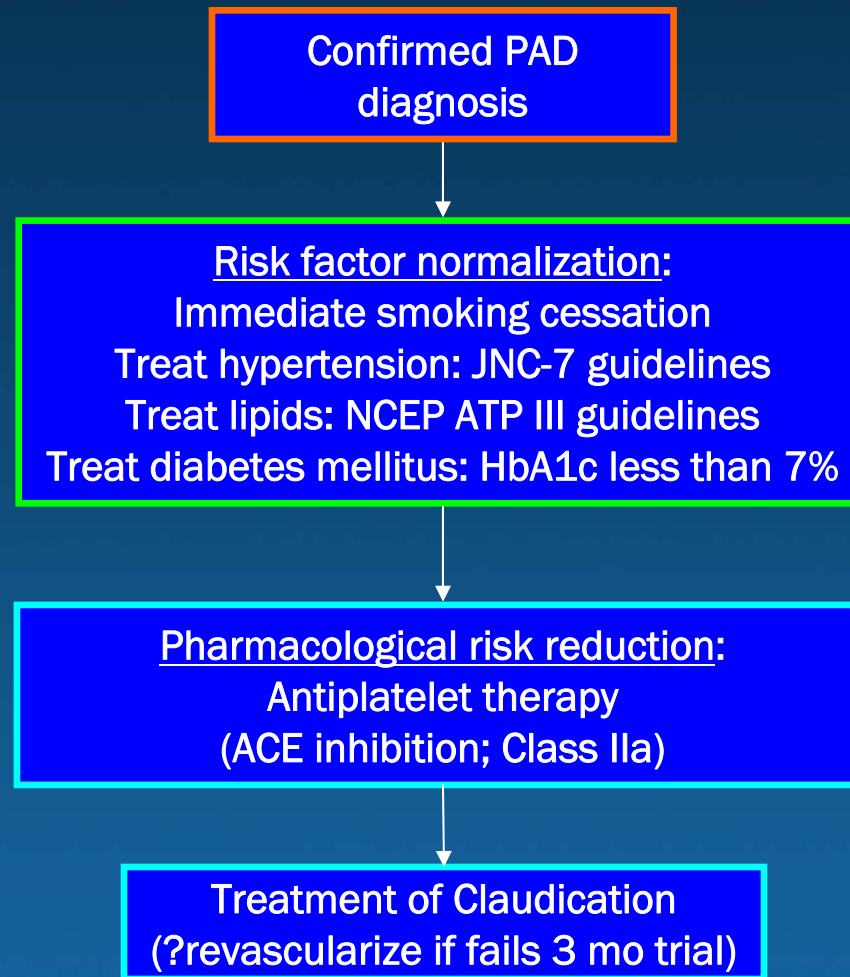


Computed Tomographic Angiography (CTA)

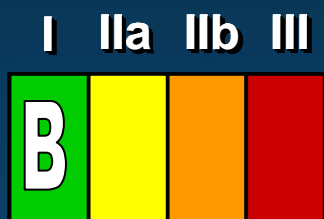


- Requires iodinated contrast
- Requires ionizing radiation
- Use to plan intervention/revascularization
- Shows arterial calcification

ACC/AHA Guideline for the Management of PAD: They have “*the disease*”



Medical Therapy for Claudication



-Treatment with a statin to achieve a target LDL cholesterol of less than 100 mg/dl.

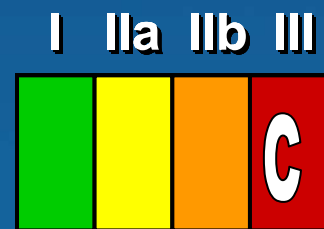
-Anti-HTN therapy to goal <140/90 (non-DM) or <130/80 (DM); *beta-blockers not contra-indicated*

-Antiplatelet therapy—ASA or Clopidogrel

-Supervised exercise program of 30-45 min. over 3xweek for 12 weeks

-Stop smoking

-Cilostazol 100mg bid (in absence of heart failure)



-NOT INDICATED: pentoxifylline (IIb), L-arginine, ginko biloba, oral prostaglandins, Vit E, chelation

Indications for Revascularization in the Patient With Intermittent Claudication

- A lack of adequate response to exercise therapy and drugs
- Presence of a serious impairment of activities important to the patient—work, ADL's, cardiac rehab.
- Absence of concurrent disease that limits exercise (e.g., angina or chronic respiratory disease).
- The individual's anticipated natural history and prognosis.
- Appropriate lesion morphology

Renovascular Hypertension: Clinical clues

- Female with severe HTN and no FHx (FMD?)
- Uncontrolled HTN on 3 Rx (including diuretic)
- Worsening HTN control in compliant pt
- ARF or elevated Cr with new ARB or ACEI
- CRI with mild proteinuria and bland sediment
- Recurrent flash pulmonary edema
- > 1.5 cm difference in renal size
- Epigastric bruit
- HTN + PAD

Noninvasive evaluation of RAS

- Duplex Ultrasound
- CTA or MRA
- Less useful:
 - Captopril renal scan
 - Renal Vein renin sampling
 - Plasma Renin
 - Captopril Test



AAA screening and testing

- **Asymptomatic:**
 - Class I
 - Men 60 years of age or older with FHx of AAA
 - Class IIa
 - Men who are over 65 years of age who have ever smoked need directed PE and duplex once
- **Symptomatic**
 - **Class I**
 - In patients with the clinical triad of abdominal and/or back pain, pulsatile mass or hypotension need immediate surgical evaluation
 - In patients with symptomatic aortic aneurysms, repair is indicated regardless of diameter

The PAD Guideline is Intended to Guide Lifelong Primary to Specialty PAD Care

Population at risk:
(Age and risk factors)
Establish the PAD diagnosis

Population with symptoms:
Improve limb outcomes
Prevent CV ischemic events

Population remains at risk:
Primary care
management of
legs and life, in
collaboration with
vascular specialists

- ABI/TBI
- PVR
- Duplex US
- MRA
- CTA
- Angiography



Medical
Therapy



Endovascular
Therapy



Surgical
Therapy

Integrated care requires a partnership of vascular specialists (vascular medicine, cardiology, interventional radiology, surgery, podiatry, and others)

www.padcoalition.org

A public, interdisciplinary, not-for-profit Coalition devoted to creating a national PAD public awareness campaign and to coordinating PAD public and physician education.



Supplemental slides

Rose Questionnaire for PAD

- Pain with walking Y Sens 99% Spec 13%
 - Pain standing or sitting N 99% 80%
 - Walking uphill or hurry Y 98 13
 - Ordinary pace on level ground -- --
 - Relief standing still Y 91 64
 - Where is the pain calf > thigh/buttock
-
- Overall 91% specific and 99% sensitive for diagnosing intermittent claudication in symptomatic patients

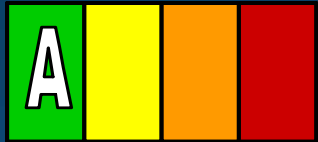
Differential Diagnosis of PAD

- **Intermittent Claudication**
 - Atherosclerosis
 - Non-Atherosclerotic
 - TAO/Buerger's
 - Popliteal Art. Entrapment Syndrome
 - Adventitial Cystic Dis. of the Popliteal Artery
 - FMD
 - Vasculitis
 - Trauma/Radiation
- **Musculoskeletal Causes**
 - Arthritis
 - Bursitis
 - Tendonitis
 - Athlete's Comp. Syn.
 - Bakers Cyst
- **Venous Claudication**
- **Neurogenic Causes**
 - Lumbar Canal Stenosis
 - Peripheral Neuropathy
- **Podiatric Causes**
 - Plantar Fasciitis

Noninvasive Imaging Tests

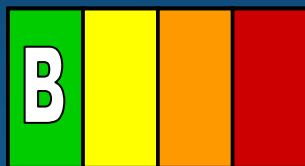
Magnetic Resonance Angiography (MRA)

I IIa IIb III



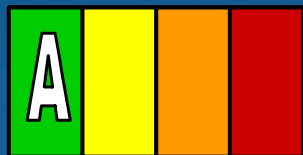
MRA of the extremities is useful to diagnose anatomic location and degree of stenosis of PAD.

I IIa IIb III



MRA of the extremities should be performed with a gadolinium enhancement.

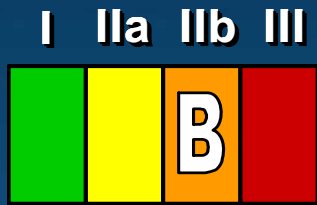
I IIa IIb III



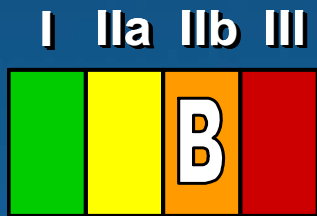
MRA of the extremities is useful in selecting patients with lower extremity PAD as candidates for endovascular intervention.

Noninvasive Imaging Tests

Computed Tomographic Angiography (CTA)



CTA of the extremities may be considered to diagnose anatomic location and presence of significant stenosis in patients with lower extremity PAD.



CTA of the extremities may be considered as a substitute for MRA for those patients with contraindications to MRA.

Medications for Patients With PAD

Therapeutic Goal

Drug	To Reduce Ischemic Events	To Improve Claudication Symptoms
Clopidogrel (Plavix [®])	Yes	No
Cilostazol (Pletal [®])	No	Yes

Endovascular Treatment for Claudication

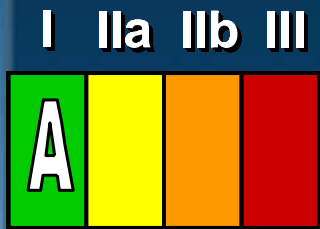
I IIa IIb III



Endovascular procedures are indicated for individuals with a vocational or lifestyle-limiting disability due to intermittent claudication when clinical features suggest a reasonable likelihood of symptomatic improvement with endovascular intervention *and...*

- a. Response to exercise or pharmacologic therapy is inadequate, *and/or*
- b. there is a very favorable risk-benefit ratio (e.g. focal aortoiliac occlusive disease)

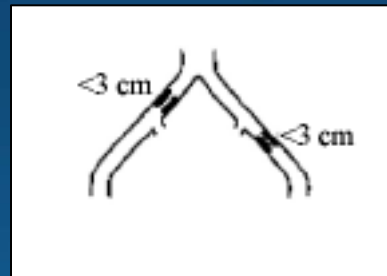
Endovascular Treatment for Claudication



Endovascular intervention is recommended as the preferred revascularization technique for TASC type A iliac and femoropopliteal lesions.

Iliac

TASC A:
(PTA recommended)



Femoropopliteal



TASC B: (insufficient data to recommend)

