

Intercepting PAD

Playbook for Cardiovascular Care 2018

February 24, 2018

Jonathan D Woody, MD, FACS

University Surgical Vascular

Attending Vascular Surgeon - Piedmont Athens Regional

Adjunct Clinical Associate Professor

Faculty of Medical Sciences

College of Public Health

University of Georgia

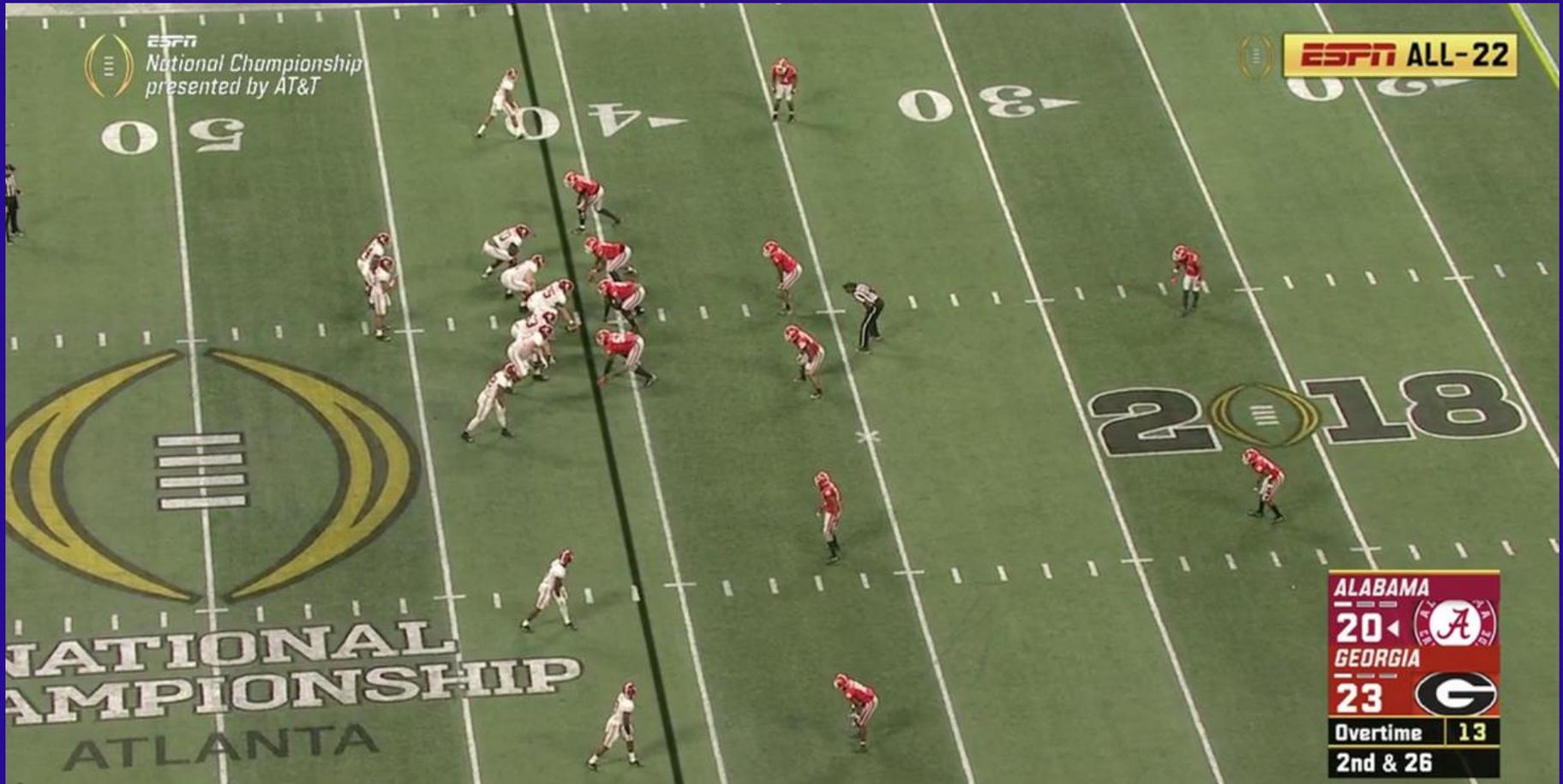
SVS

Society for
Vascular Surgery



UNIVERSITY SURGICAL
VASCULAR

2nd and 26



Disclosure

I have no relevant financial disclosures

Outline

Definition

Risk Factors

Diagnosis

Treatment

 Claudication (IC)

 Critical Limb Ischemia (CLI)

 Acute Ischemia

Summary

Quiz

What is PAD

Peripheral Arterial Disease

Atherosclerosis of the peripheral arterial system

Most commonly lower extremities

Rule of Three for PAD Symptoms

Claudication

Rest Pain

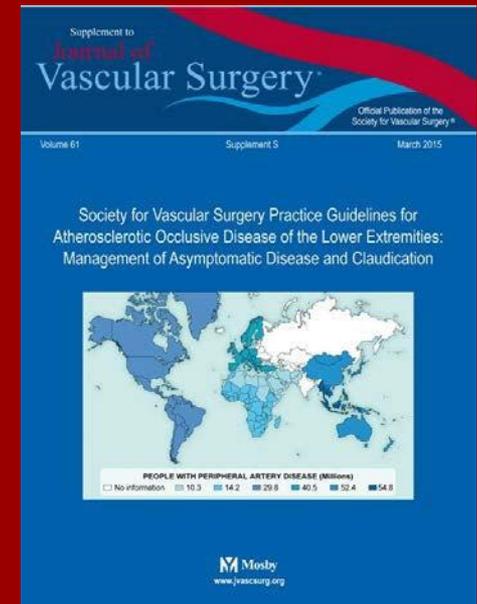
Tissue Loss



Society for
Vascular Surgery

Society for Vascular Surgery Practice Guidelines for Atherosclerotic Occlusive Disease of the Lower Extremities: Management of Asymptomatic Disease and Claudication

Journal of Vascular Surgery
March 2016 Supplement
Volume 61, Issue 3, p 1S-74S



Intermittent Claudication

Exercise induced discomfort in a specific muscle group

Relieved by rest

Consistent and reproducible

Typically involves calf, may affect any leg muscle group

thigh / buttock

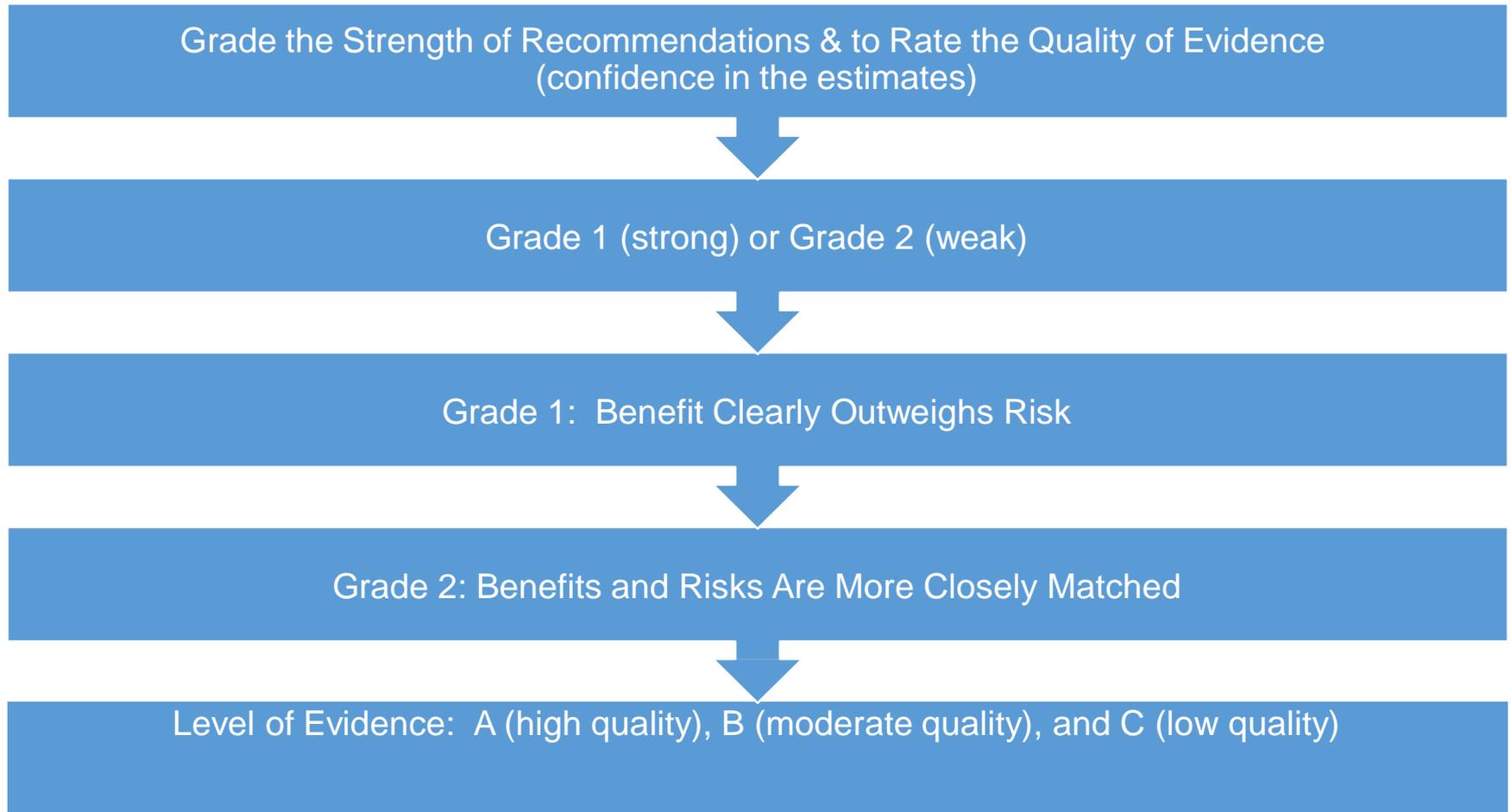
Caused by arterial obstruction proximal to affected muscle bed

Leads to transient muscle ischemia

On demand ischemic muscle pain

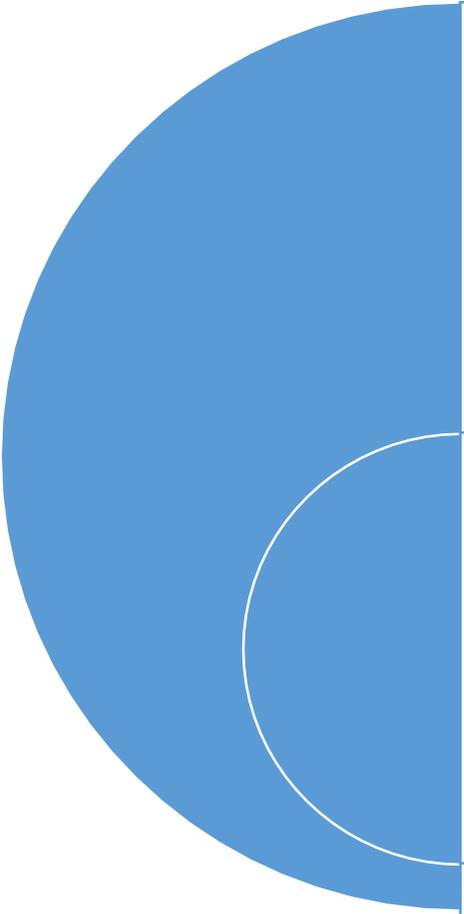
“Angina of the leg”

Grades of Recommendation Assessment, Development, and Evaluation (GRADE)



Epidemiology and Risk Factors

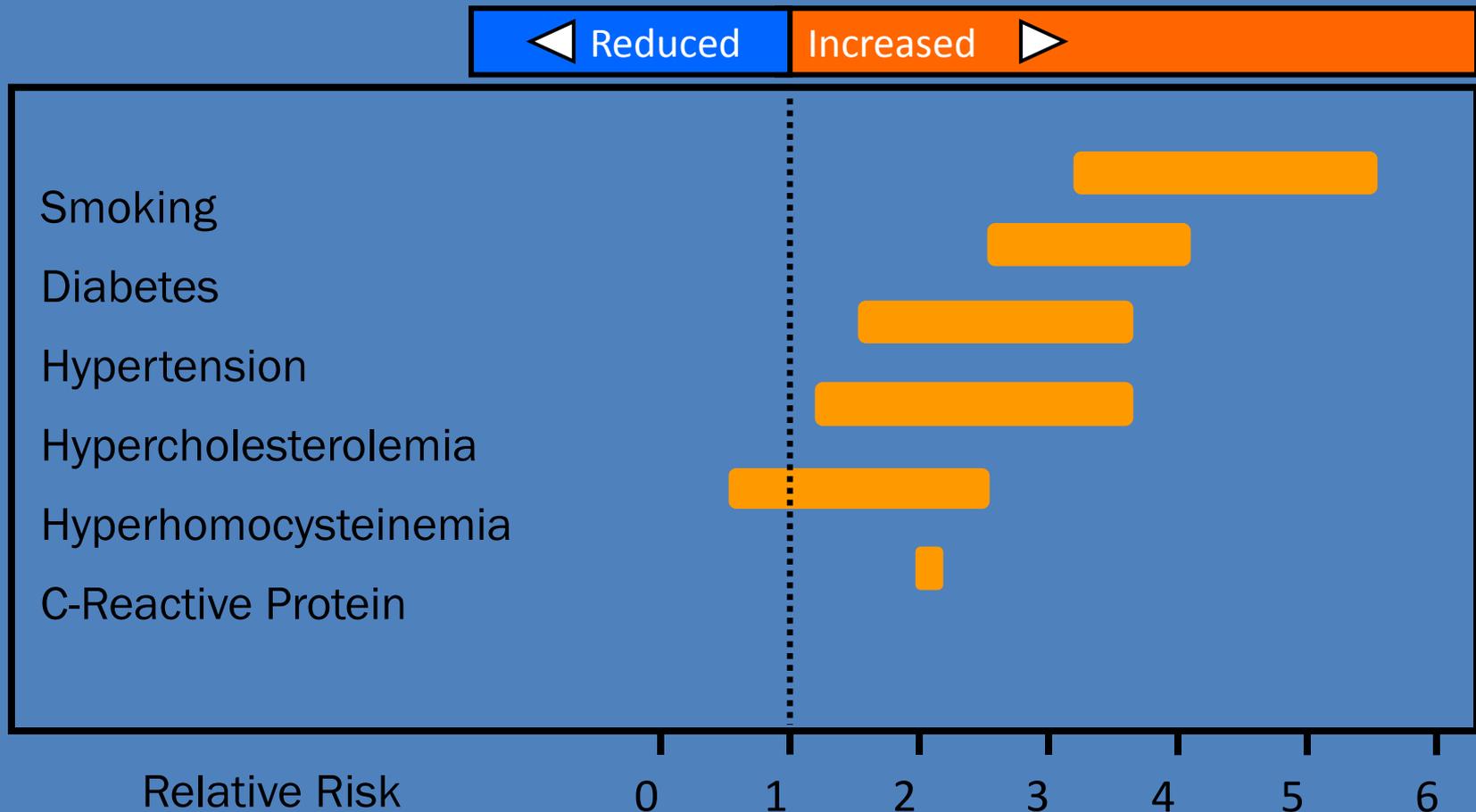
Patients with PAD



8 to 12 million Americans are affected by PAD

Prevalence of PAD is expected to increase in the U.S. and worldwide as the population ages, cigarette smoking persists, and the epidemic of diabetes mellitus, hypertension, and obesity grows

Risk Factors for PAD



Patients at Increased Risk of PAD

- Age \geq 65
- Age 50–64 with risk factors for atherosclerosis (e.g., diabetes mellitus, history of smoking, hyperlipidemia, hypertension) or family history of PAD
- Age $<$ 50 with diabetes mellitus and 1 additional risk factor for atherosclerosis
- Individuals with known atherosclerotic disease in another vascular bed (e.g., coronary, carotid, subclavian, renal, mesenteric artery stenosis, or AAA)

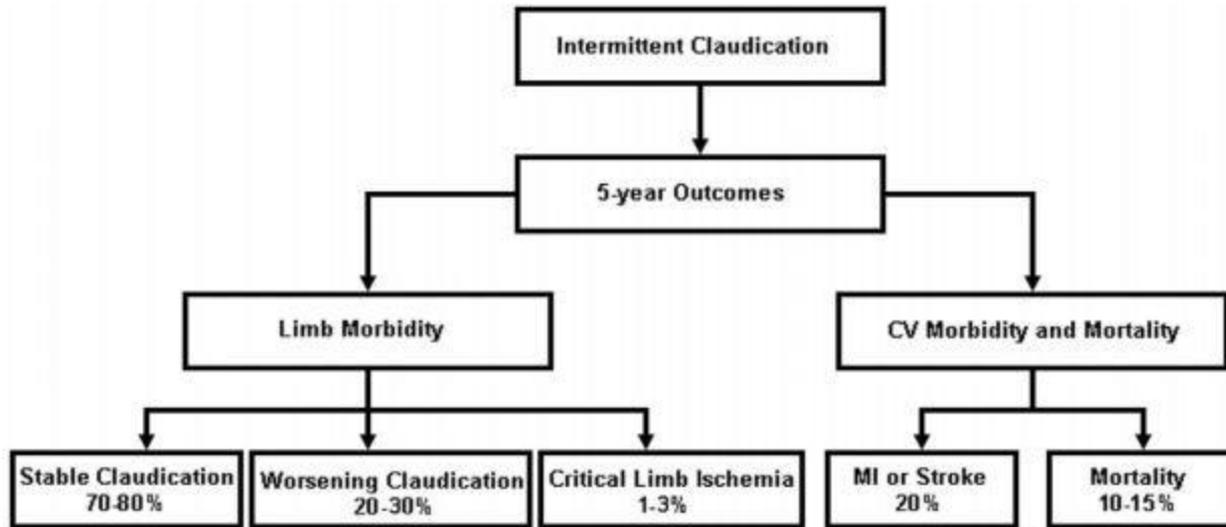


Fig 2. The natural history of patients with intermittent claudication (IC) treated with non-invasive management. CV, Cardiovascular; MI, myocardial infarction. Adapted from American College of Cardiology/American Heart Association guidelines.⁴³

Rarely progresses to CLI

High risk of M&M

Society for Vascular Surgery practice guidelines for atherosclerotic occlusive disease of the lower extremities: Management of asymptomatic disease and claudication
 Conte, Michael S. et al.
Journal of Vascular Surgery, Volume 61, Issue 3, 2S - 41S.e1

Diagnosis

The First Tool to Establish the PAD Diagnosis: *A Standardized Physical Examination*

Pulses should be assessed and recorded



When all else fails, examine the patient

Vascular Examination

Most sensitive tool for pulse exam is



WNL = we never looked

Only contraindication to pulse exam is absence of a finger

History and/or Physical Examination Findings Suggestive of PAD

History

- Claudication
- Non–joint-related exertional lower extremity symptoms
- Impaired walking function
- Ischemic rest pain

Physical Examination

- Abnormal lower extremity pulse examination
- Nonhealing lower extremity wound
- Lower extremity gangrene
- Other suggestive lower extremity physical findings (e.g., elevation pallor/dependent rubor)

Diagnosis of Peripheral Arterial Disease (PAD)

Recommendation	Grade	LOE
2.1. We recommend using the ABI as the first-line noninvasive test to establish a diagnosis of PAD in individuals with symptoms or signs suggestive of disease. When the ABI is borderline or normal (>0.9) and symptoms of claudication are suggestive, we recommend an exercise ABI.	1 	A
2.2. We suggest against routine screening for lower extremity PAD in the absence of risk factors, history, signs, or symptoms of PAD.	2	C
2.3. For asymptomatic individuals who are at elevated risk, such as those aged >70, smokers, diabetic patients, those with an abnormal pulse examination, or other established cardiovascular disease, screening for lower extremity PAD is reasonable if used to improve risk stratification, preventive care, and medical management.	2	C
2.4. In symptomatic patients who are being considered for revascularization, we suggest using physiologic noninvasive studies, such as segmental pressures and pulse volume recordings, to aid in the quantification of arterial insufficiency and help localize the level of obstruction.	2	C
2.5. In symptomatic patients in whom revascularization treatment is being considered, we recommend anatomic imaging studies, such as arterial duplex ultrasound, CTA, MRA, and contrast arteriography.	1	B

Ankle Brachial Index

- ABI

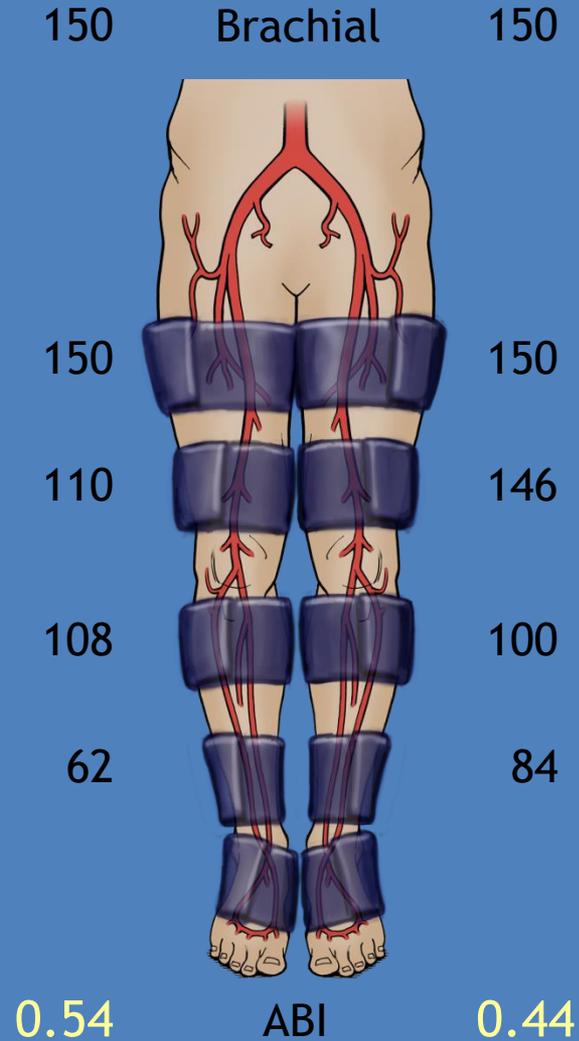
1.0 - 0.7 no symptoms

0.5 - 0.7 claudication

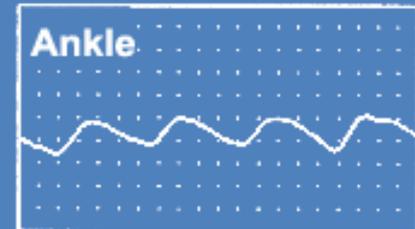
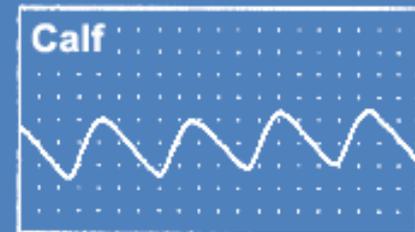
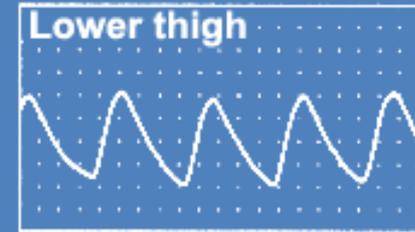
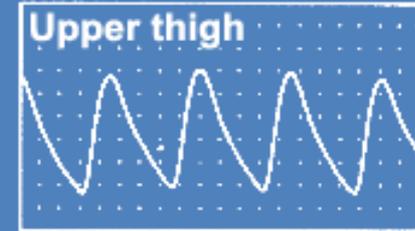
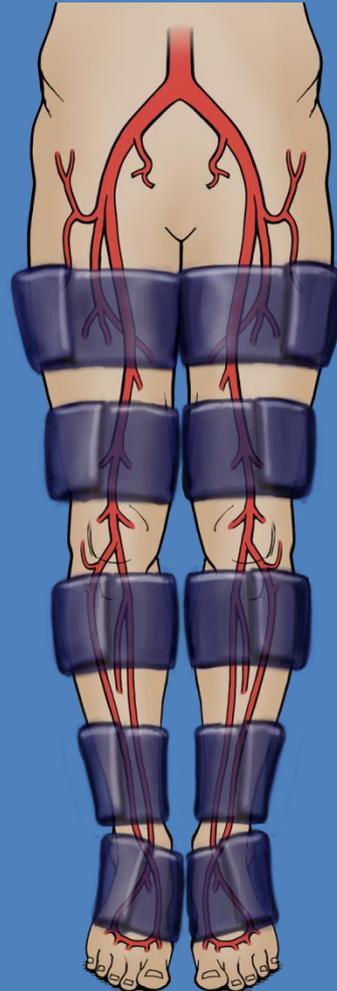
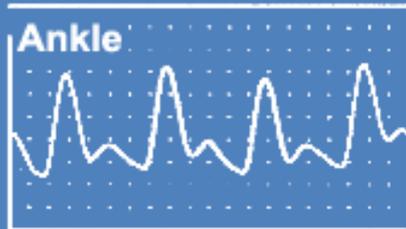
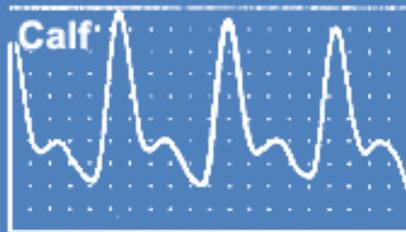
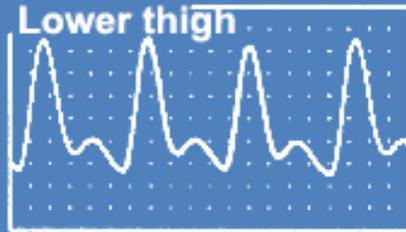
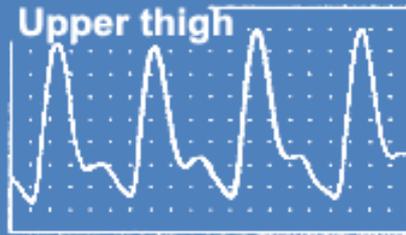
< 0.4 rest pain, ulceration, gangrene

ABI = 0.65 → 65% of normal blood flow

Segmental Pressures (mm Hg)



Pulse Volume Recordings



Management of Asymptomatic Patients with PAD

Management of Asymptomatic Disease

Recommendation	Grade	LOE
3.1. We recommend multidisciplinary comprehensive smoking cessation interventions for patients with asymptomatic PAD who use tobacco (repeatedly until tobacco use has stopped).	1 	A
3.2. We recommend providing education about the signs and symptoms of PAD progression to asymptomatic patients with PAD.	1	Ungraded
3.3. We recommend against invasive treatments for PAD in the absence of symptoms, regardless of hemodynamic measures or imaging findings demonstrating PAD.	1	B

Medical / Non-Interventional Management of the Patient with IC

Medical Treatment for Intermittent Claudication (IC)

Recommendation	Grade	LOE
4.1. We recommend multidisciplinary comprehensive smoking cessation interventions for patients with IC (repeatedly until tobacco use has stopped).	1	A
4.2. We recommend statin therapy in patients with symptomatic PAD.	1	A
4.3. We recommend optimizing diabetes control (hemoglobin A1c goal of <7.0%) in patients with IC if this goal can be achieved without hypoglycemia.	1	B
4.4. We recommend the use of indicated β -blockers (eg, for hypertension, cardiac indications) in patients with IC. There is no evidence supporting concerns about worsening claudication symptoms.	1	B
4.5. In patients with IC due to atherosclerosis, we recommend antiplatelet therapy with aspirin (75-325 mg daily).	1	A
4.6. We recommend clopidogrel in doses of 75 mg daily as an effective alternative to aspirin for antiplatelet therapy in patients with IC.	1	B
4.7. In patients with IC due to atherosclerosis, we suggest against using warfarin for the sole indication of reducing the risk of adverse cardiovascular events or vascular occlusions.	1	C
4.8. We suggest against using folic acid and vitamin B12 supplements as a treatment of IC.	2	C
4.9. In patients with IC who do not have congestive heart failure, we suggest a 3- month trial of cilostazol (100 mg twice daily) to improve pain-free walking.	2	A
4.10. In patients with IC who cannot tolerate or have contraindications for cilostazol, we suggest a trial of pentoxifylline (400 mg thrice daily) to improve pain-free walking.	2	B

Cilostazol, Pentoxifylline, and Chelation Therapy

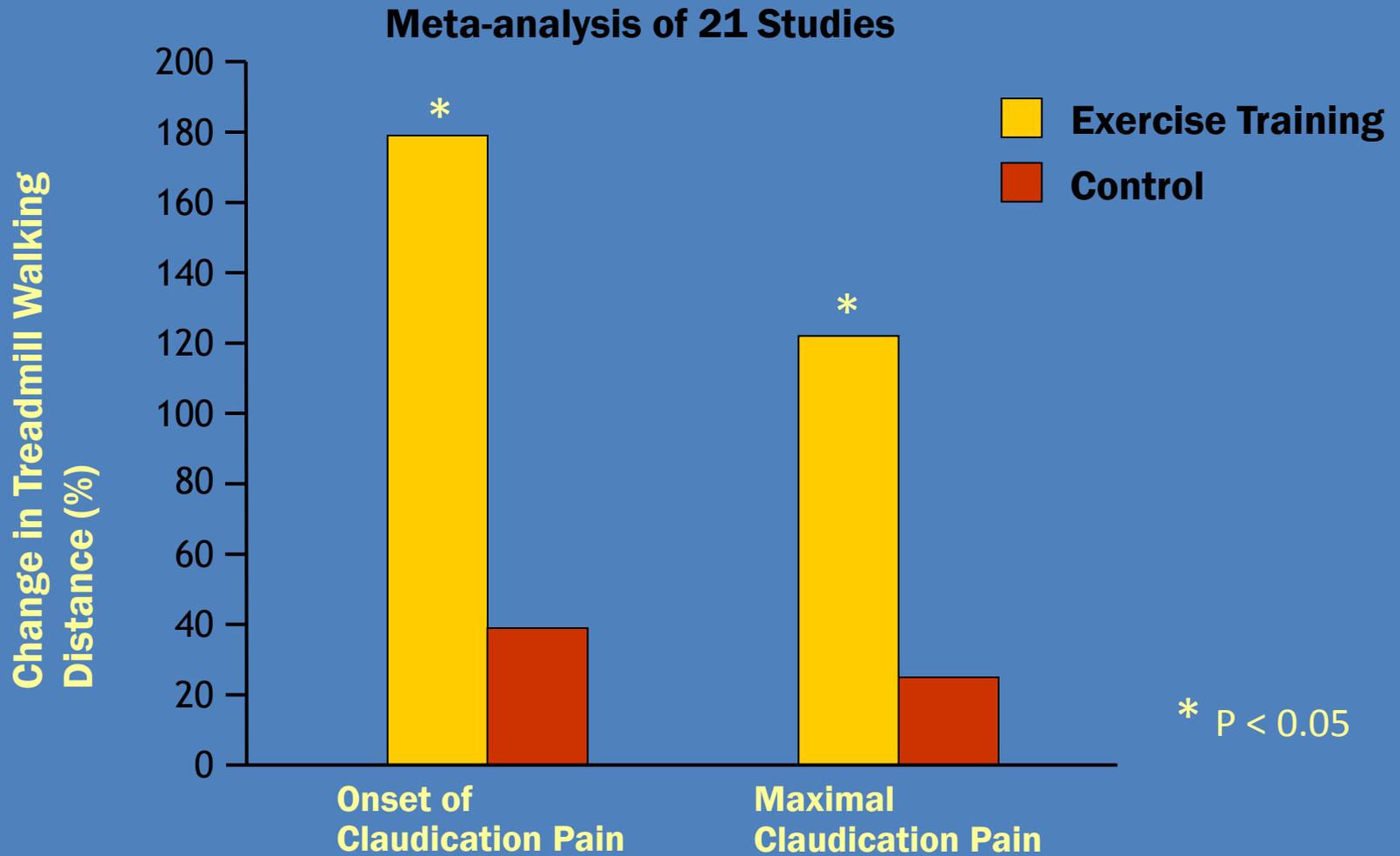
COR	LOE	Recommendations
Cilostazol		
I	A	Cilostazol is an effective therapy to improve symptoms and increase walking distance in patients with claudication.
Pentoxifylline		
III: No Benefit	B-R	Pentoxifylline is not effective for treatment of claudication.
Chelation Therapy		
III: No Benefit	B-R	Chelation therapy (e.g., ethylenediaminetetraacetic acid) is not beneficial for treatment of claudication.



Exercise Therapy

Recommendation	Grade	LOE
<p>4.12. We recommend as first-line therapy a supervised exercise program consisting of walking a minimum of three times per week (30-60 min/session) for at least 12 weeks to all suitable patients with IC.</p>	<p>1</p> 	<p>A</p>
<p>4.13. We recommend home-based exercise, with a goal of at least 30 minutes of walking three to five times per week when a supervised exercise program is unavailable or for long-term benefit after a supervised exercise program is completed.</p>	<p>1</p> 	<p>B</p>
<p>4.14. In patients who have undergone revascularization therapy for IC, we recommend exercise (either supervised or home based) for adjunctive functional benefits.</p>	<p>1</p> 	<p>B</p>
<p>4.15. We recommend that patients with IC be followed up annually to assess compliance with lifestyle measures (smoking cessation, exercise) and medical therapies as well as to determine if there is evidence of progression in symptoms or signs of PAD. Yearly ABI testing may be of value to provide objective evidence of disease progression.</p>	<p>1</p>	<p>C</p>

Effects of Exercise Training on Claudication



The Role of Revascularization for IC

Rule of Three

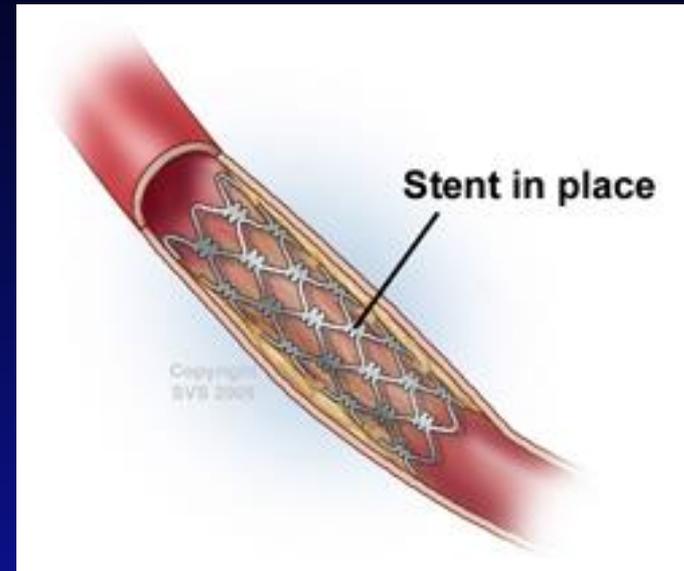
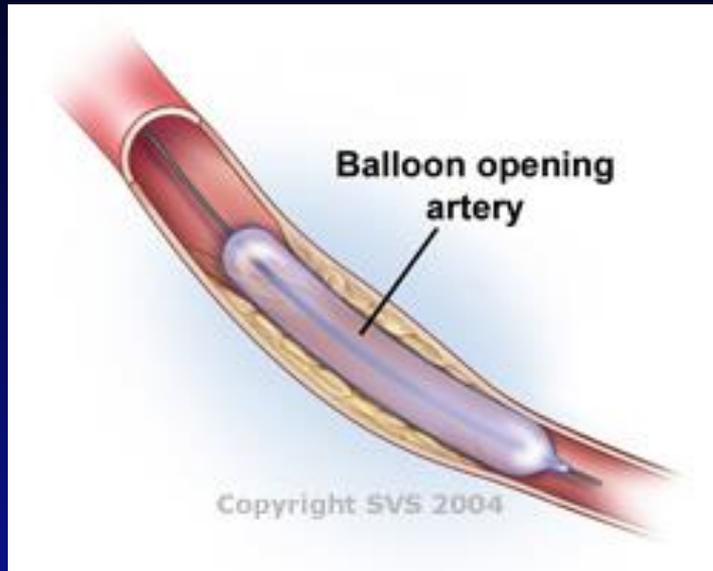
- **Revascularization**

1. Endovascular

2. Endarterectomy

3. Bypass

Angioplasty / Stenting



nch

LT



0:00
7:50
11:07:17

3
Z: 3
C: 563
W: 683
1-4..36

ch

LT



0:00
1:33
12:26:06

10
553
633
1-9
IM 9

h

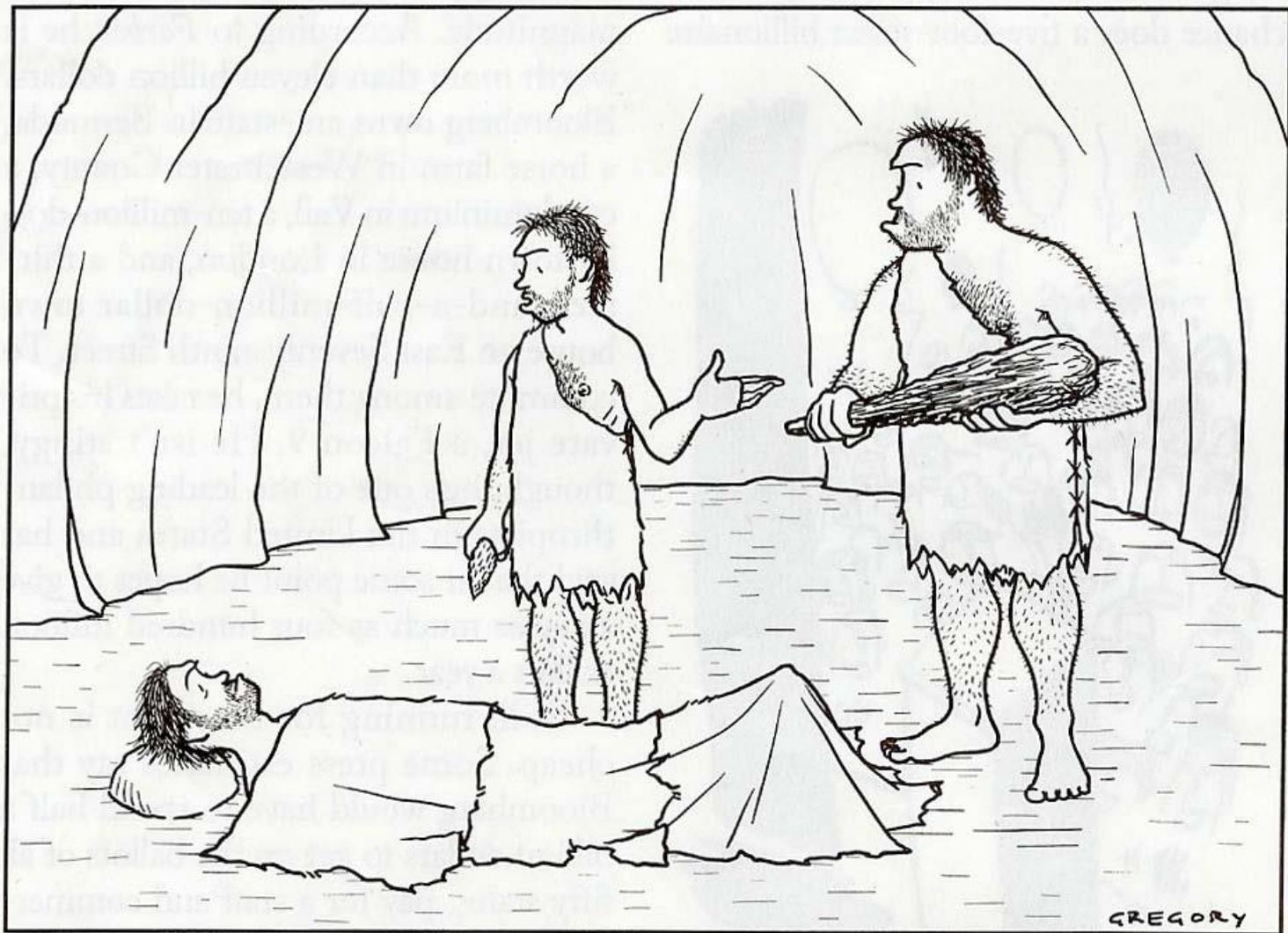


LT

0:00
3:83
13:18:21

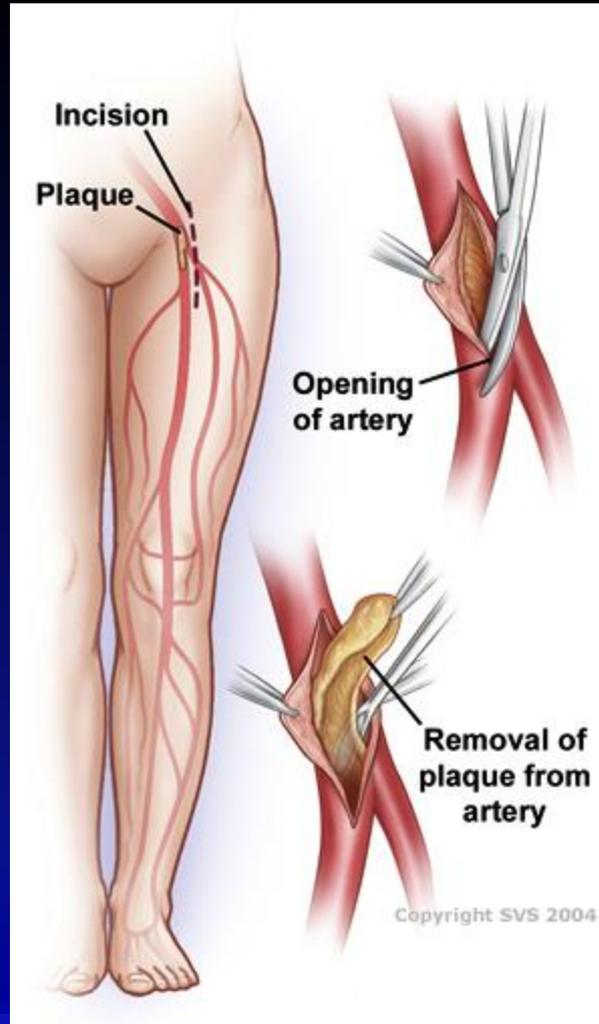
24
1-3..24

Open Surgery

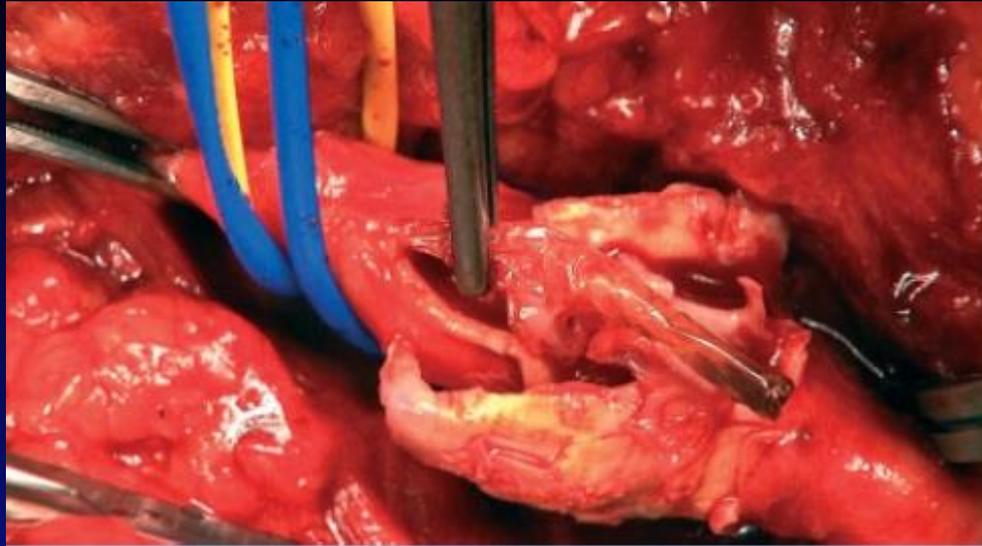


"I'll be performing the operation, and this is the anesthesiologist."

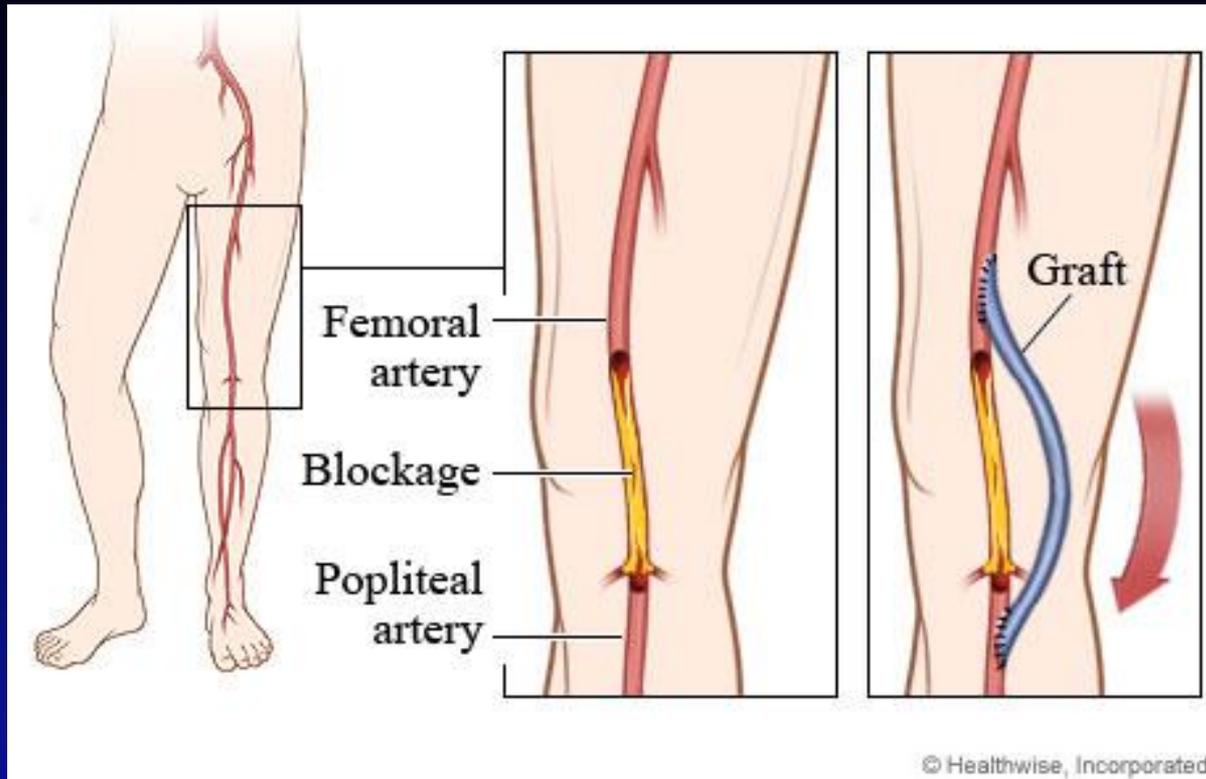
Endarterectomy



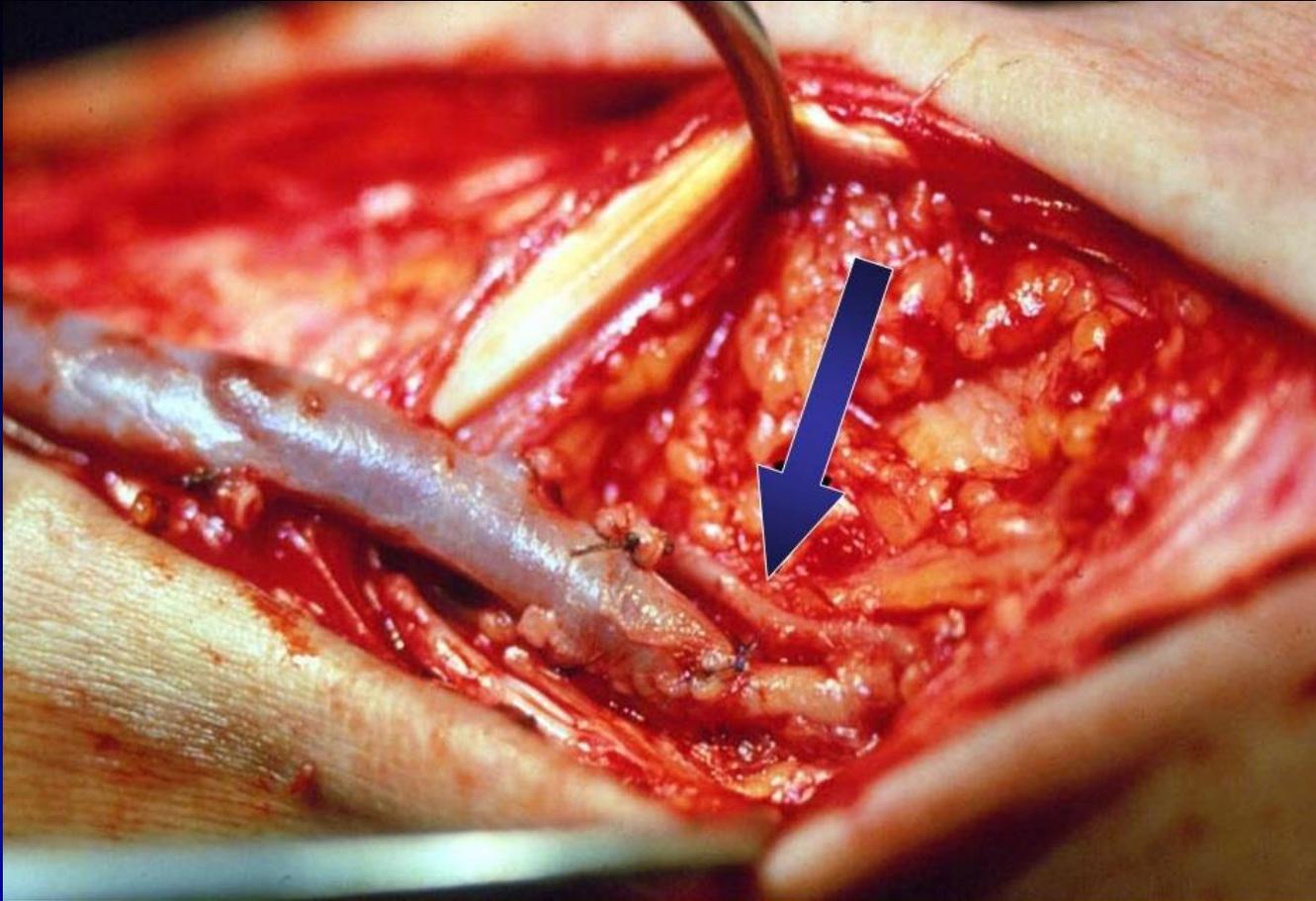
Endarterectomy



Bypass



Bypass



Aortobifemoral Bypass



General Considerations on Invasive Treatment for Intermittent Claudication (IC)

Recommendation	Grade	LOE
5.1. We recommend EVT or surgical treatment of IC for patients with significant functional or lifestyle-limiting disability when there is a reasonable likelihood of symptomatic improvement with treatment, when pharmacologic or exercise therapy, or both, have failed, and when the benefits of treatment outweigh the potential risks.	1 	B
5.2. We recommend an individualized approach to select an invasive treatment for IC. The modality offered should provide a reasonable likelihood of sustained benefit to the patient (>50% likelihood of clinical efficacy for at least 2 years). For revascularization, anatomic patency (freedom from hemodynamically significant restenosis) is considered a prerequisite for sustained efficacy.	1 	C

Interventions for Aortoiliac Occlusive Disease (AIOD) in Intermittent Claudication (IC) – (Part 1)

Recommendation	Grade	LOE
5.3. We recommend endovascular procedures over open surgery for focal AIOD causing IC.	1	B
5.4. We recommend endovascular interventions as first-line revascularization therapy for most patients with common iliac artery or external iliac artery occlusive disease causing IC.	1	B
5.5. We recommend the selective use of BMS or covered stents for aortoiliac angioplasty for common iliac artery or external iliac artery occlusive disease, or both, due to improved technical success and patency.	1	B
5.6. We recommend the use of covered stents for treatment of AIOD in the presence of severe calcification or aneurysmal changes where the risk of rupture may be increased after unprotected dilation.	1	C
5.7. For patients with diffuse AIOD (eg, extensive aortic disease, disease involving both common and external iliac arteries) undergoing revascularization, we suggest either endovascular or surgical intervention as first-line approaches. Endovascular interventions that may impair the potential for subsequent AFB in surgical candidates should be avoided.	2	B
5.8. EVT of AIOD in the presence of aneurysmal disease should be undertaken cautiously. We recommend that the modality used should either achieve concomitant aneurysm exclusion or should not jeopardize the conduct of any future open or endovascular aneurysm repair.	1	C
5.9. In all patients undergoing revascularization for AIOD, we recommend assessing the CFA. If hemodynamically significant CFA disease is present, we recommend surgical therapy (endarterectomy) as first-line treatment.	1	B



Interventions for Aortoiliac Occlusive Disease (AIOD) in Intermittent Claudication (IC) - (Part 2)

Recommendation	Grade	LOE
5.10. In patients with iliac artery disease and involvement of the CFA, we recommend hybrid procedures combining femoral endarterectomy with iliac inflow correction.	1	B
5.11. We recommend direct surgical reconstruction (bypass, endarterectomy) in patients with reasonable surgical risk and diffuse AIOD not amenable to an endovascular approach, after one or more failed attempts at EVT, or in patients with combined occlusive and aneurysmal disease.	1 	B
5.12. In younger patients (age <50 years) with IC, we recommend a shared decision-making approach to engage patients and inform them of the possibility of inferior outcomes with either endovascular or surgical interventions.	2	C
5.13. We recommend either axial imaging (eg, CT, MR) or catheter-based angiography for evaluation and planning of surgical revascularization for AIOD.	1	Ungraded
5.14. When performing surgical bypass for aortoiliac disease, concomitant aneurysmal disease of the aorta or iliac arteries should be treated as appropriate (exclusion) and is a contraindication to end-to-side proximal anastomoses.	1	Ungraded
5.15. For any bypass graft originating from the CFA, the donor iliac artery must be free of hemodynamically significant disease or any pre-existing disease should be corrected before performing the bypass graft.	1	Ungraded

Intervention for Femoropopliteal Occlusive Disease (FPOD) in Intermittent Claudication (IC)

Recommendation	Grade	LOE
5.16. We recommend endovascular procedures over open surgery for focal occlusive disease of the SFA artery not involving the origin at the femoral bifurcation.	1	C
5.17. For focal lesions (<5 cm) in the SFA that have unsatisfactory technical results with balloon angioplasty, we suggest selective stenting.	2	C
5.18. For intermediate-length lesions (5-15 cm) in the SFA, we recommend the adjunctive use of self expanding nitinol stents (with or without paclitaxel) to improve the midterm patency of angioplasty.	1	B
5.19. We suggest the use of preoperative ultrasound vein mapping to establish the availability and quality of autogenous vein conduit in patients being considered for infrainguinal bypass for the treatment of IC.	2	C
5.20. We recommend against EVT of isolated infrapopliteal disease for IC because this treatment is of unproven benefit and possibly harmful.	1	C
5.21. We recommend surgical bypass as an initial revascularization strategy for patients with diffuse FP disease, small caliber (<5 mm), or extensive calcification of the SFA, if they have favorable anatomy for bypass (popliteal artery target, good runoff) and have average or low operative risk.	1	B
5.22. We recommend using the saphenous vein as the preferred conduit for infrainguinal bypass grafts.	1	A
5.23. In the absence of suitable vein, we suggest using prosthetic conduit for FP bypass in claudicant patients, if the above-knee popliteal artery is the target vessel and good runoff is present.	2	C



Postinterventional medical therapy in Intermittent Claudication (IC)

Recommendation	Grade	LOE
5.24. In all patients after endovascular or open surgical intervention for claudication, we recommend optimal medical therapy (antiplatelets agents, statins, antihypertensives, control of glycemia, smoking cessation).	1 	A
5.25. In patients undergoing lower extremity bypass (venous or prosthetic), we suggest treatment with antiplatelet therapy (aspirin, clopidogrel, or aspirin plus clopidogrel).	2	B
5.26. In patients undergoing infrainguinal endovascular intervention for claudication, we suggest treatment with aspirin and clopidogrel for at least 30 days.	2	B

Which Treatment is Best



Patient Preference



Treatment – Open vs Endo

- Clinical guidelines remain vague regarding indications for and appropriate use of revascularization strategies
- Ultimately, clinicians must weigh risks and benefits in determining which patients have the greatest chance for success with revascularization

Surveillance After Revascularization for IC

PAD Surveillance



Surveillance After Revascularization for Intermittent Claudication (IC)

Recommendation	Grade	LOE
<p>6.1. We suggest that patients treated with open or endovascular interventions for IC be monitored with a clinical surveillance program that consists of an interval history to detect new symptoms, ensure compliance with medical therapies, record subjective functional improvements, pulse examination, and measurement of resting and, if possible, post exercise ABIs.</p>	<p>2</p> 	<p>C</p>
<p>6.2. We suggest that patients treated with lower extremity vein grafts for IC be monitored with a surveillance program that consists of clinical follow-up and duplex scanning</p>	<p>2</p>	<p>C</p>
<p>6.3. We suggest that patients who have previously undergone vein bypass surgery for IC and have developed a significant graft stenosis on DUS be considered for prophylactic reintervention (open or endovascular) to promote long-term bypass graft patency</p>	<p>1</p>	<p>C</p>

Critical Limb Ischemia

Critical Limb Ischemia

Rest Pain

Severe ischemia
Continuous pain
Dependent rubor

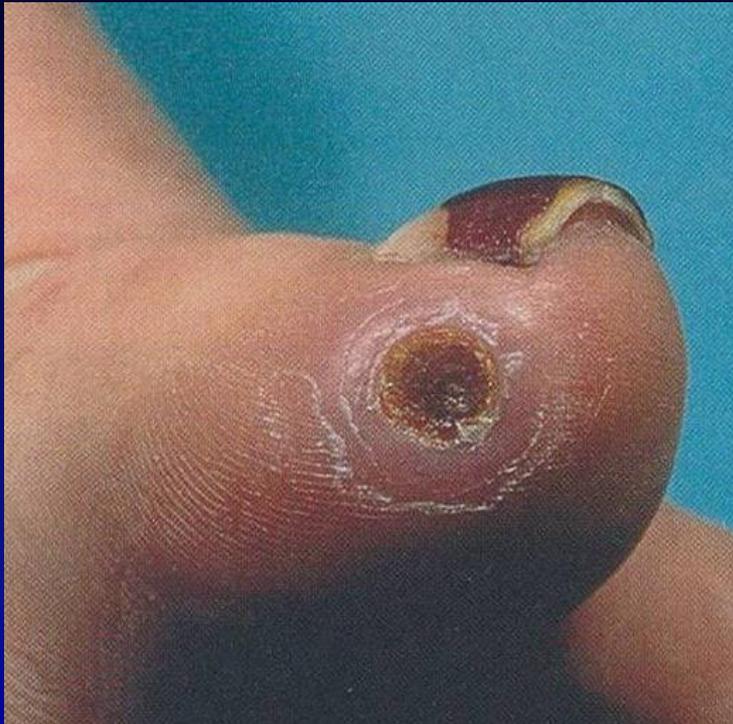
Tissue Loss

Gangrene
spontaneous necrosis of severely ischemic tissue
Non healing wound
Infection

CLI is BAD

Critical Limb Ischemia

Non-healing wound



Gangrene



WIFI Classification

a, Estimate risk of amputation at 1 year for each combination

	Ischemia – 0				Ischemia – 1				Ischemia – 2				Ischemia – 3			
W-0	VL	VL	L	M	VL	L	M	H	L	L	M	H	L	M	M	H
W-1	VL	VL	L	M	VL	L	M	H	L	M	H	H	M	M	H	H
W-2	L	L	M	H	M	M	H	H	M	H	H	H	H	H	H	H
W-3	M	M	H	H	H	H	H	H	H	H	H	H	H	H	H	H
	fl- 0	fl- 1	fl- 2	fl- 3												

Four classes: for each box, group combination into one of these four classes

Very low = VL = clinical stage 1

Low = L = clinical stage 2

Moderate = M = clinical stage 3

High = H = clinical stage 4

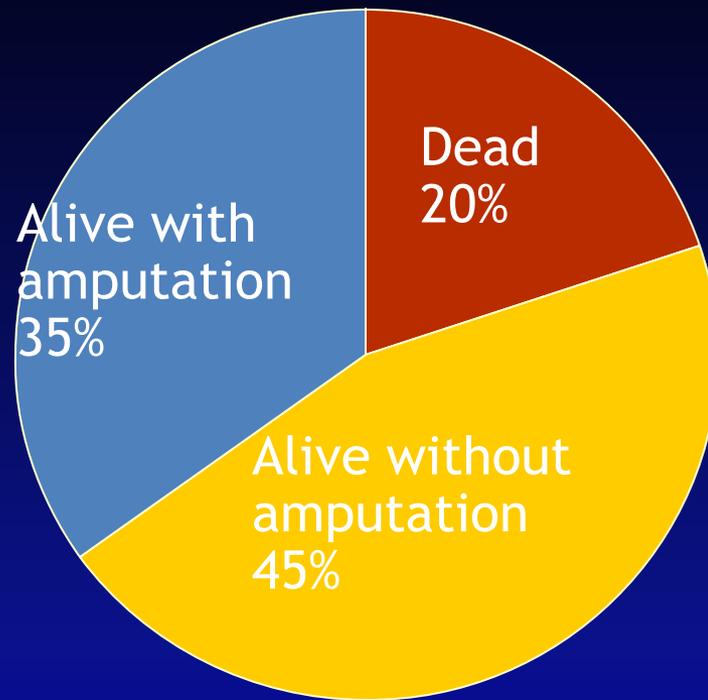
Clinical stage 5 would signify an unsalvageable foot

Wound, Ischemia, Foot Infection

Critical Limb Ischemia (CLI)

Fate of Patients With CLI After Initial Treatment

Summary of 6-month outcomes from 19 studies



➤ CLI is bad

Don't Wait Until It's Too Late



Acute Ischemia

The 6 Ps of Acute Ischemia

Pulselessness

Pain

Pallor

Poikilothermia

Paresthesia

Paralysis

EMERGENCY

Remember This...

Take Home Message

- PAD is manifestation of systemic atherosclerosis
 - *confers higher risk of MI, stroke, death*
- Aggressive risk factor modification
- Exercise program
- Claudication rarely progresses to amputation
- Intervention for appropriate patients
- Minimally invasive is maximally preferred
- Old fashioned surgery is still the gold standard
- Surveillance is mandatory
- Critical Limb Ischemia is BAD
- Acute ischemia is BAD
- You can't diagnose it if you don't think of it
- Treat your PAD patient – ALL IN – *save a limb, save a life!!!*

Quiz Time

Real News or Fake News



Risk Factors for PAD

Smoking

Diabetes

Hyperlipidemia

Hypertension

Cancer

Risk Factors for PAD

Smoking

Diabetes

Hyperlipidemia

Hypertension

Cancer ← ← ←



Symptoms of PAD

Claudication

Rest pain

Tissue Loss

Leg swelling

Symptoms of PAD

Claudication

Rest pain

Tissue Loss

Leg swelling ← ← ←



Treatment of PAD

Smoking cessation

Risk factor modification

Anti-platelet therapy

Exercise program

Endovascular procedure

Open surgery

Treatment of PAD

- Smoking cessation
- Risk factor modification
- Anti-platelet therapy
- Exercise program
- Endovascular procedure
- Open surgery



Medal Ceremony





UNC

University of National Champions

1957, 1982, 1993, 2005, 2009, 2017



SVS

Society for
Vascular Surgery