

Peripheral Artery Disease: MSHS Ambulatory Care Quick Reference Guide



Background

- **Peripheral Artery Disease (PAD)** is atherosclerotic artery disease, most typically in lower extremity.
- **PAD Guideline Directed Medical Therapy (GDTM)** used only 30-40% due to clinical knowledge gaps.
 - There is significant evidence that adherence to 4 recommended therapies reduces risk of adverse cardiovascular (36%) and limb events (44%)³.
 - Examples of the 4 GDTMs include: aspirin, statin medications, ACE inhibitors, and smoking cessation.
- Only 10% of patients with PAD exhibit classic claudication.
 - **~50% are asymptomatic**
 - ~40% have atypical leg symptoms (i.e. knee pain, hip pain, etc.)
- **African Americans have twice the risk** compared with other races.
- **High annual mortality of 5-7% in PAD patients** without critical limb ischemia.

Diagnosis

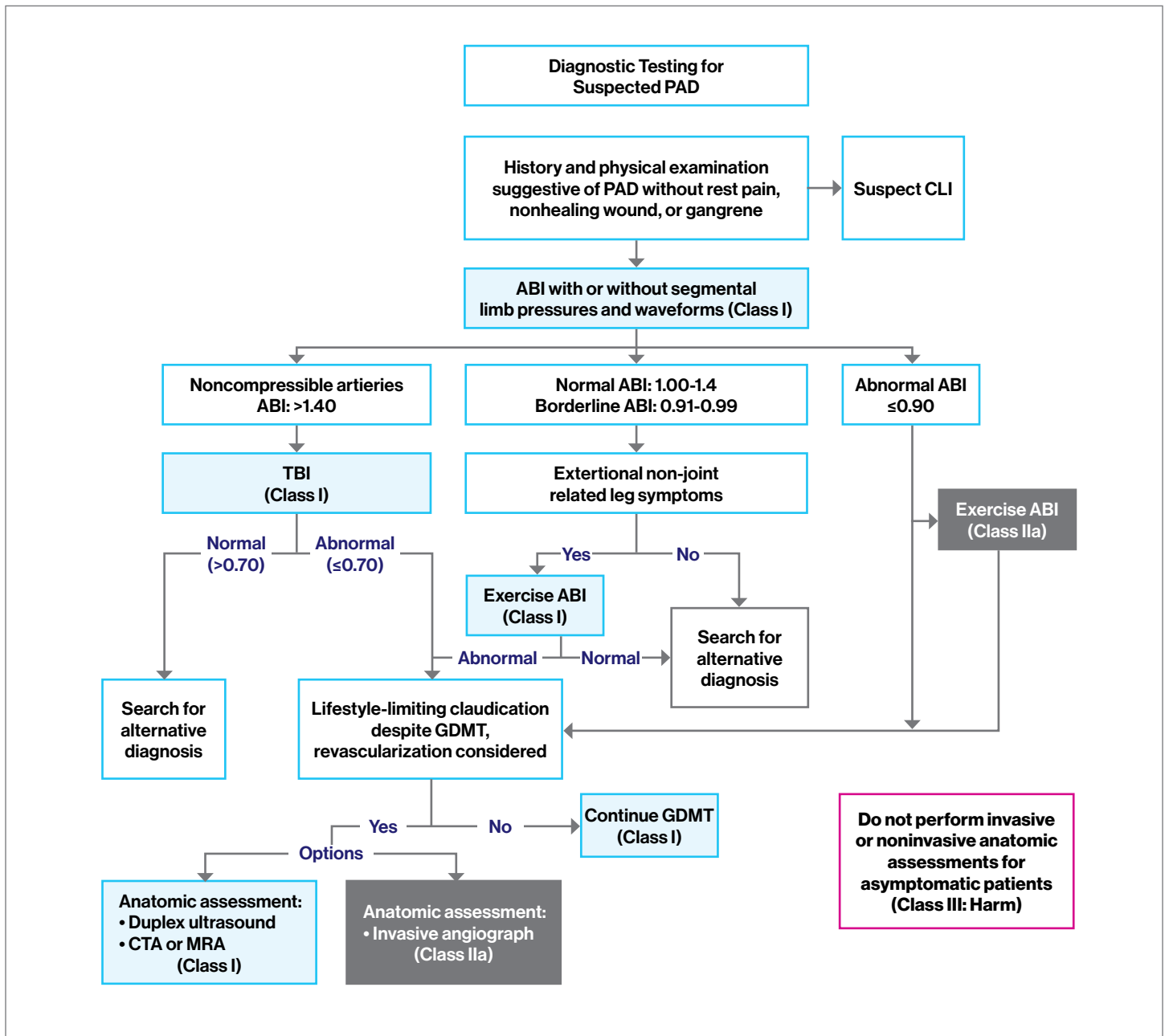
- **Risk Factors:** Age > 65, tobacco use, DM, HTN, hyperlipidemia, AAA, known atherosclerotic disease, and family history of PAD.
- **History Clues:** Lower extremity pain, more specifically claudication, other non-joint related exertional leg symptoms, impaired walking
 - Claudication = reproducible discomfort (cramping, aching, pain) or fatigue in the muscles of the lower extremity occurring with exertion and relieved within 10 minutes of rest.
- **Physical Exam:** Diminished pulses, vascular bruits, pallor, rubor, non-healing wounds, any evidence of lower extremity gangrene
- **Differential diagnosis may be broad and includes:**
 - Venous ulcer, symptomatic Baker's cyst, local trauma, neuropathy, infection, small artery occlusion (microangiopathy), drug reaction/toxicity, autoimmune injury, inflammatory disorder, spinal stenosis, nerve root compression, arthritis of hip, ankle or foot, chronic compartment syndrome.

Testing and Assessment for Intervention (also see figure 1 on page 2):

Diagnosis and Assessment for PAD	Test to Order	Indication	Next Steps Based on Result
Diagnosis	Ankle Brachial Index (ABI): 1.0-1.39 (normal range)	If history and/or exam suggestive of PAD Screening is reasonable if asymptomatic, but PAD risk factors present	<ul style="list-style-type: none"> • ABI 1.0-1.39: Look for other causes of symptoms/abnormal exam • ABI = 0.91-0.99: Possible PAD → Obtain Exercise Treadmill ABI or 6 MWT* • ABI < 0.90 → GDTM* if CLI* not present • ABI > 1.40 → Obtain Toe Brachial Index: TBI < 0.70 indicates PAD • If CLI suspected and ABI non-compressible, obtain TBI with waveforms or toe perfusion pressure
Anatomical Assessment	CT Angiogram, or Magnetic Resonance Angiogram	Indicated if considering revascularization procedure or surgery	<ul style="list-style-type: none"> • Revascularization should be considered for ALI, CLI or symptomatic iliac disease, or infrainguinal disease that significantly impairs functional status/QoL* despite GDTM and exercise therapy.

* 6 MWT: 6 minute walk test
 GDTM: Guideline directed medical therapy
 ALI: acute limb ischemia
 CLI: Critical leg ischemia
 QoL: Quality of Life

FIG. 1: Diagnostic Testing for Suspected PAD



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Colors correspond to Class of Recommendations.

ABI indicates ankle-brachial index; CLI, critical limb ischemia; CTA, computed tomography angiography; GDMT, guideline-directed management and therapy;

MRA, magnetic resonance angiography; PAD, peripheral artery disease; and TBI, toe-brachial index.

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Management/Treatment Specifics

Goals

- Eliminate/reduce claudication to improve mobility, functional status and health related QoL
- Reduce risk of fatal and non-fatal ischemic cardiovascular events and limb loss

Peripheral Artery Disease (PAD) Management Checklist for Front Line Providers

Management	Intervention	Frequency/Dosing	Considerations
Prior to Any Vascular Intervention	Asymptomatic PAD (ABI < 0.9): ASA or Clopidogrel ¹	ASA 81mg daily or Plavix 75 mg daily	
	Symptomatic PAD: ASA + Rivaroxaban, OR, if increased risk of bleeding, ASA OR Clopidogrel ^{4,5}	ASA 81 mg Rivaroxaban 2.5 mg two times a day OR, if increased risk of bleeding, Aspirin 81 mg daily OR Clopidogrel 75 mg daily	<ul style="list-style-type: none"> • ASA and Rivaroxaban may improve CV outcomes, with modestly increased risk of bleeding • If there is an increased risk of bleeding, ASA or Clopidogrel can be used as a treatment method • Dual antiplatelet therapy (DAPT) generally not recommended for symptomatic or asymptomatic PAD
Post-Vascular Intervention	ASA + Rivaroxaban OR ASA + Clopidogrel ^{6,7}	ASA 81 mg daily plus Rivaroxaban 2.5 mg bid OR ASA 81 mg daily plus Clopidogrel 75 mg daily	<ul style="list-style-type: none"> • ASA and Rivaroxaban may reduce risk of adverse CV and limb events after revascularization • If risk of bleeding is increased, DAPT with ASA and Clopidogrel may be used
Cilostazol	Reduces claudication; increases walking	100 mg BID	<ul style="list-style-type: none"> • Side effects: Headache, palpitations, and diarrhea • Contraindicated in presence of Heart Failure and/or EF <40%
Hypertension Management	Target Blood Pressure: < 130/< 80	Monthly until controlled, then every 3-6 months	<ul style="list-style-type: none"> • No preferred agent in absence of other disorders (DM, CKD, CHF) • Beta-blockers not associated with worsening claudication • First line is often ACE inhibitors
Diabetes Management	HbA1c <7% (unless risk > benefit)	Controlled: q 6 months Poorly controlled: q 3 months	<ul style="list-style-type: none"> • Intensify medications to optimize control • Biannual foot exam with monofilament test
Lipid Management	LDL target <70 mg/dl	Ongoing treatment	<ul style="list-style-type: none"> • Moderate or high intensity statin therapy, indicated for all PAD patients, regardless of cholesterol level, to reach LDL target • Ezetimibe (\$) may be added to achieve LDL goal • PCSK-9 inhibitors (\$\$\$) may reduce CV and adverse limb events when added to statins, though expensive
Tobacco Screening and Cessation	<ul style="list-style-type: none"> • Screen all patients annually with regular follow-up to ensure cessation • Refer to smoking cessation program • Medication options include bupropion, varenicline, or nicotine replacement 	Active smokers: Address every visit	<ul style="list-style-type: none"> • Provide a medication prescription even if patient not ready to fill, so no wait when patient is ready • Detailed discussion on "what will happen to your health and limbs if you continue smoking"
Exercise Program	Supervised or Home Based Resources: https://mshp.mountsinai.org/web/mshp/for-vascular-disease-patients	3-5 sessions per week	<ul style="list-style-type: none"> • Home Based Exercise performed 3-5x/week, beginning possibly with 10 minutes of walking exercise per session • Increasing walking per session by 5 min per week, until patient walking 45-50 min per session (excluding rest periods) • Treadmill-based exercise therapy program for patients with PAD: 30 to 60 minute exercise sessions, three times a week, for minimum of 12 weeks, with additional 36 sessions, if warranted.
Revascularization	<ul style="list-style-type: none"> • Claudication severity, presence of iliac disease, and QoL drives revascularization decision • <10-15% progress to CLI over 5 years • Note: 0.15 increase in ABI is considered significant post procedure 	Performed in conjunction with GDMT and exercise therapy	<ul style="list-style-type: none"> • Iliac disease: Generally treated with revascularization • Below Iliac disease: Generally, GDMT + Exercise Therapy are initial therapies • When CLI present, endovascular and/or surgical procedures used to provide in-line blood flow to 1 patent artery • Surgical patency rates higher than endovascular procedures, but with more complications • Post-procedure follow-up with periodic ABI measurements and, in some patients, Doppler ultrasound is warranted.

* NOAC: Novel Oral Anticoagulant, CLI: Critical leg ischemia, QoL: Quality of Life, GDMT: Guideline Directed Medical Therapy

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When to Refer to a Vascular Specialist

- Debilitating Claudication
- Lifestyle Limiting Activity
- Diabetes & Foot Wound
- Non-healing Foot Wounds
- Known PAD & Foot Wound

Additional Management Considerations

1. Supervised/Home Exercise Programs:

- **Effectively reduce claudication and atypical symptoms, improve both functioning and QoL, alone or in conjunction with revascularization.**
- Other exercise strategies include upper-body ergometry and cycling for patients with leg amputations

2. Foot care for patients with Diabetes:

- Biannual foot exams including pulses/perfusion, use 10g monofilament and either temp, pinprick, vibration, or ankle reflexes to detect neuropathy
- Refer patients with PAD to podiatrist
- If foot ulcer present, refer to vascular specialist

3. Minimizing Risk of Tissue Loss:

- **Prevention: Patient education regarding healthy foot behaviors (e.g., daily feet inspection; foot care and hygiene, including safe toenail cutting strategies; avoidance of barefoot walking, proper shoes)**
- Prompt diagnosis and treatment of infections and other foot disorders
 - Suspect if patient has local pain, tenderness; inflammatory reaction around wound, pretibial edema; discharge or odor, or signs of a systemic inflammatory response
 - Treatment of deep soft-tissue infections typically requires prompt surgical drainage; vascular imaging and timely revascularization
- **Goal:** Complete wound healing

4. Acute Limb Ischemia is a medical emergency typically requiring prompt anticoagulation, emergency consultation with vascular specialist, and thrombolysis or thrombectomy for viable limbs.

PAD: Clinical Integrated Care Considerations and Information

Refer to Vascular Medicine/Cardiology:

- Assistance in managing coexisting PAD risk factors, such as HTN, lipid disorders
- Pre-operative assessment of high risk patients
- Confirm diagnosis of PAD when symptoms atypical and/or normal/ borderline noninvasive tests
- **Phone number: 212-241-9454** to request an appointment with Dr. Olin at The Lauder Family Cardiovascular Ambulatory Center

Refer to Surgery (i.e. Vascular Specialist):

- Determine the most appropriate diagnostic testing and arrange
- Revascularization in patients with refractory symptoms despite GDMT
- Manage acute and critical limb ischemia
- Treatment of non-healing skin and soft tissue infections and non-healing wounds
- **Diagnostic Testing Available by Location:**
 - **All Locations:** ABI Testing, Exercise ABI, Toe Brachial Index (with waveforms), Toe Perfusion Pressure
 - **MS-West & MS Downtown Only:** Transcutaneous O₂ pressure

Hospital	Location of Vascular Surgery / Outpatient Wound Care	Vascular Surgery Phone Numbers
The Mount Sinai Hospital	17 East 102nd Street, 4th Floor, New York, NY 10029	212-659-8554
	1190 Fifth Avenue, 1st Floor GP-1 Center, New York, NY 10029	212-241-5315
Mount Sinai Morningside	440 West 114th Street, Ambulatory Care Center, New York, NY 10025 CVI 2nd Floor Suite 220 OR ACC 1 – 1st Floor	212-523-3360
Mount Sinai West	425 West 59th Street, 7th Floor, New York, NY 10019	212-523-4797
Mount Sinai Queens	Mount Sinai Queens Pavilion 25-20 30th Avenue, 5th Floor, Astoria, NY 11102	718-808-7777
Mount Sinai Downtown	10 Union Square East, 2nd Floor Suite 2N, New York, NY 10003	212-844-5559
Mount Sinai Brooklyn	MS Outpatient Vascular Office: 3131 Kings Hwy Room LL07	718-677-0109
Mount Sinai South Nassau	1420 Broadway 2nd Floor, Hewlett, NY 11557	516-374-8682 Wound Care: 516-764-4325

** Wound Care is offered at all locations, except MS-South Nassau sees patients at their Wound Care Center

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PAD: Clinical Integrated Care Considerations and Information (continued)

Refer to Interventional Radiology:

- Diagnostic angiography and therapeutic catheter-based interventions in symptomatic PAD

Hospital	Location	Phone Numbers
Mount Sinai West	1000 Tenth Avenue 2nd Floor New York, NY 10019	212-241-4046 (Press 1)
Mount Sinai East	5 East 98th Street 12th Floor New York, NY 10029	212-241-4046 (Press 1)
Mount Sinai Queens	25-10 30th Avenue, Astoria, NY 11102	347-408-8234

- See website for other locations: <https://www.mountsinai.org/care/interventional-radiology/team>

Exercise Program

- Supervised Office Based:
 - Offered by Cardiac Rehabilitation @Mount Sinai Hospital.
Phone: 212-427-1540
 - Physical Therapy @ Mount Sinai Downtown Union Square,
Use Epic “PT” referral or Phone: 212-844-8750
- Home-Based Exercise:
 - Mount Sinai Hospital, MS-Morningside, MS-West, and MS South Nassau Vascular Surgery Locations above provide Self-Guided Handouts
- Online Resources: <https://mshp.mountsinai.org/web/mshp/for-vascular-disease-patients>

Behavioral Health

- The prevalence of depression or depressive symptoms in PAD patients is 11-48%, with high rates in female patients, African Americans, and those with advanced disease.
- Annual screening with PHQ2/9 is recommended, with treatment by PCP or behavioral health provider.

Care Management Referral

- Patients who would benefit from nursing education: medication education, diabetic foot care, disease management, or self-management.
- Indicated for patients needing care coordination, history of treatment non-adherence, complex psychosocial needs, and/or avoidable Emergency Room or Inpatient admissions
- Use “MSHP Care Management” Referral in Epic, email mshpcmreferral@mountsinai.org or phone: **212-241-7228**.

Home Health Care Referral

- Home-based care may be arranged using “Consult to Visiting Nurse Services” order in Epic for the following, but are not limited to:
 - Home-based wound care
 - Home-based visiting physical therapist
 - Home-based nursing education and visits

References:

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5. Anand SS et al. Lancet. 2018 Jan 20;391(10117):219-229.
6. Bonaca MP et al. N Engl J Med. 2020;382:1994-2004
7. Mount Sinai Health System Experts: Dr. Jeffrey Olin, Dr. Peter Faries, Dr. Soma Brahmanandam