PAD 101

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Outline

1. Scope/Prevalence
2. Risk Factors
3. Anatomy
4. Clinical Presentations/Classification
5. History & Exam, Differential Diagnosis
6. Natural History and Outcomes
Scope of PAD

- PAD of atherosclerotic origin has an incidence and prevalence nearly equal to CAD\(^1\)

- PAD is underdiagnosed as only 10-30% of all PAD patients have symptoms such as intermittent claudication\(^2,3\)

- PAD affects almost 12 million people in the US and 20% of symptomatic patients with PAD have diabetes

- PAD is a risk factor for lower extremity amputation and for systemic vascular disease in coronary, cerebral, and renal vessels\(^4\)

3. JAMA 2001;286:1599-606
4. Vasc Med 2001;6(Suppl. 1):3-7
Diagnosis of Pad in High-Risk Patients in Primary Care

- PARTNERS – 6,979 patients across the US (primary care offices)
- Presence of PAD & CAD evaluated in:
  * All patients ≥70
  * Age 50-69 with DM +/- Smoking

1. Hirsch AT et. al. JAMA 2001;286:1317
Estimated Number of PAD Cases and Contributing Age Groups in Eight WHO Regions (2010)


LMIC = low-income and middle-income countries.
HIC = high-income countries.
<table>
<thead>
<tr>
<th>PAD Risk Factors</th>
<th>OR (95% CI)</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAD</td>
<td>2.27</td>
<td>&lt; 0.0001</td>
</tr>
<tr>
<td>Smoker</td>
<td>2.09</td>
<td>&lt; 0.0001</td>
</tr>
<tr>
<td>Ex-Smoker</td>
<td>1.87</td>
<td>&lt; 0.0001</td>
</tr>
<tr>
<td>C-Reactive Protein</td>
<td>1.69</td>
<td>0.01</td>
</tr>
<tr>
<td>Diabetes</td>
<td>1.68</td>
<td>&lt; 0.0001</td>
</tr>
<tr>
<td>HTN (≥ 140/90 mmHg)</td>
<td>1.47</td>
<td>&lt; 0.0001</td>
</tr>
<tr>
<td>Age (per 10 year increase)</td>
<td>1.39</td>
<td>&lt; 0.0001</td>
</tr>
<tr>
<td>Hypertriglyceridemia</td>
<td>1.22</td>
<td>0.0002</td>
</tr>
<tr>
<td>Hypercholesterolemia</td>
<td>1.16</td>
<td>&lt; 0.0001</td>
</tr>
<tr>
<td>Male Sex</td>
<td>0.83</td>
<td>0.001</td>
</tr>
<tr>
<td>Body Mass Index (&gt; 25 Kg/m²)</td>
<td>0.83</td>
<td>&lt; 0.0001</td>
</tr>
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Individuals at Risk for PAD

Based on the epidemiologic evidence base, an “at risk” population for PAD can be objectively defined by:

• Age <50 years with diabetes, + 1 additional risk factor (e.g., smoking, dyslipidemia, HTN or hyperhomocysteinemia)
• Age 50 - 69 years and history of smoking or diabetes
• Age ≥ 70 years
• Leg symptoms with exertion (suggestive of claudication)
• Ischemic rest pain
• Abnormal lower extremity pulse examination
• Known atherosclerotic coronary, carotid, or renal artery disease

Prevalence and Distribution of Single-bed and Poly-Vascular Disease in REDuction of Atherothrombosis for Continued Health Registry

CAD = coronary artery disease; CBVD = cerebrovascular disease; PAD = peripheral artery disease.

Lower Extremity Arterial Anatomy
PAD Clinical Syndromes

- Asymptomatic (50%)
- Atypical Leg Pain (33%)
- Classic Claudication (15%)
- Critical Limb Ischemia (1-2%)
- Acute Limb Ischemia (1-2%)
# Rutherford Classification

<table>
<thead>
<tr>
<th>Stage</th>
<th>Clinical Symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Asymptomatic</td>
</tr>
<tr>
<td>1</td>
<td>Mild Claudication</td>
</tr>
<tr>
<td>2</td>
<td>Moderate Claudication</td>
</tr>
<tr>
<td>3</td>
<td>Severe Claudication</td>
</tr>
<tr>
<td>4</td>
<td>Rest Pain</td>
</tr>
<tr>
<td>5</td>
<td>Ulcer</td>
</tr>
<tr>
<td>6</td>
<td>Advanced Ulcer, Gangrene</td>
</tr>
</tbody>
</table>

**ACUTE LIMB ISCHEMIA – 5P’s**
- PAIN
- PULSELESSNESS
- PALLOR
- PARESTHESIAS
- PARALYSIS

**“Critical Limb Ischemia”**
- Amputation rate 10-40%
- 3x MI, Stroke, Vascular Death (c/w claudicants)
- Implies chronicity
### Symptom History

<table>
<thead>
<tr>
<th>Location of Pain</th>
<th>Location of PAD</th>
</tr>
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<tbody>
<tr>
<td>Buttock and Hip</td>
<td>Aorto-iliac disease</td>
</tr>
<tr>
<td>Thigh</td>
<td>Aorto-iliac disease or common femoral artery</td>
</tr>
<tr>
<td>Upper 2/3 of the Calf</td>
<td>Superficial femoral artery</td>
</tr>
<tr>
<td>Lower 1/3 of the Calf</td>
<td>Popliteal artery</td>
</tr>
<tr>
<td>Foot claudication</td>
<td>Tibial or peroneal artery</td>
</tr>
</tbody>
</table>
Physical Exam For PAD

• Absent or diminished femoral or pedal pulses (especially after exercising the limb)

• Arterial bruits

• Hair loss

• Poor nail growth (brittle nails)

• Dry, scaly, atrophic skin

• Dependent rubor

• Pallor with leg elevation after 1 minute at 60 degrees (normal color should return in 10 to 15 seconds; longer than 40 seconds indicates sever ischemia)

• Ischemic tissue ulceration (punched-out, painful, with little bleeding), gangrene
Differential Diagnosis

- DVT
- Musculoskeletal disorders (OA of hip or knee joints)
- Peripheral neuropathy
- Spinal stenosis – pseudoclaudication
  * lumbar canal compression
  * pain with erect posture relieved by sitting or laying down

<table>
<thead>
<tr>
<th>Historical Clue</th>
<th>Vascular Etiology</th>
<th>Neurogenic Etiology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Onset</td>
<td>Predictable</td>
<td>Variable</td>
</tr>
<tr>
<td>Only With Walking?</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Relief With Stopping/Standing?</td>
<td>Yes</td>
<td>Variable</td>
</tr>
</tbody>
</table>
PAD Natural History: 5 year Outcomes

- PAD Population
  - Non-Fatal CV Event (MI or CVA) 20%
  - Mortality 15-30%
    - CV Causes 75%
    - Non-CV Causes 25%

PAD Natural History: 5 year Outcomes

Symptomatic Patients

Limb Morbidity

Stable Claudication 70-80%

Worsening Claudication 10-20%

Critical Limb Ischemia 1-2%

PAD Natural History: 1 year Outcomes

CLI (1-2%)

- Alive with 2 limbs: 50%
- Amputation: 25%
- CV-Death: 25%