Peripheral Arterial Disease

A Case study
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Presented by Dr Ivan Benett
Case study

- Ralph is a 58 year old male
- exertional left calf discomfort at 200 yards
- symptoms occur reproducibly with exertion and relieved by rest
- PH:
  - DM
  - HTN
- Smoker 5/day
Case study

- Ramipril
- Amlodipine
- Metformin

Examination:
- palpable femoral pulses without bruits, diminished popliteal and distal pulse on left, and no positional colour changes, skin intact

How do we establish a diagnosis of PAD and assess severity?
Clinical Presentation

The Spectrum of Manifestations of PAD

- Asymptomatic
- Atypical symptoms
- Intermittent claudication
- Critical limb ischemia
  - Rest Pain
  - Ulceration
  - Necrosis/Gangrene
- Acute limb ischemia

![Image of a foot with signs of ulceration and gangrene]
<table>
<thead>
<tr>
<th>Rutherford Stage</th>
<th>Symptoms</th>
<th>Fontaine stage</th>
<th>Symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Asymptomatic</td>
<td>I</td>
<td>Asymptomatic</td>
</tr>
<tr>
<td>1</td>
<td>Claudication - mild</td>
<td>II</td>
<td>Intermittent Claudication</td>
</tr>
<tr>
<td>2</td>
<td>Claudication - moderate</td>
<td>IIa</td>
<td>IC &gt;200m</td>
</tr>
<tr>
<td>3</td>
<td>Claudication - severe</td>
<td>IIb</td>
<td>IC &lt;200m</td>
</tr>
<tr>
<td>4</td>
<td>Rest Pain</td>
<td>IV</td>
<td>Rest pain</td>
</tr>
<tr>
<td>5</td>
<td>Minor tissue loss</td>
<td>V</td>
<td>Necrosis or gangrene</td>
</tr>
<tr>
<td>6</td>
<td>Major tissue loss</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Typical vs Atypical Symptoms in Patients With Symptomatic PAD

**Typical Symptoms**

- **Intermittent claudication**
  - Exertional calf pain that causes the patient to stop walking
  - Resolves within 10 minutes of rest

**Atypical Symptoms**

- Exertional leg pain that
  - May involve areas other than the calves
  - May not stop the patient from walking
  - May not resolve within 10 minutes of rest

Other nonspecific leg symptoms that may be indicative of PAD

- Typical Symptoms: 33%
- Atypical Symptoms: >50%

References:

Examination of the peripheral vascular system
Auscultation
Only 1 in 10 patients with PAD has classical symptoms of intermittent claudication

1 in 5 people over 65 has PAD†

Only 1 in 10 of these patients has classical symptoms of intermittent claudication (IC)

†ABI<0.9

Pathophysiology

- Plaque formation

- Calcification
Common Sites of Claudication

- Obstruction in Aorta or iliac artery
- Femoral artery or branches
- Popliteal artery or distal

Ischaemia in
- Buttock, hip, thigh
- Thigh, calf
- Calf, ankle, foot
Independent Risk Factors for PAD

Relative Risk vs the General Population

- Diabetes: Reduced (4.05)
- Smoking: Increased (2.55)
- Hypertension: Increased (1.51)
- Dyslipidaemia: Reduced (1.10)

PAD diagnosis based on ABI <0.90.

Diagnostic Tests

How to Perform and Calculate the ABI

≥1.0 — Normal
0.81-0.90 — Mild Obstruction
0.41-0.80 — Moderate Obstruction
≤0.40 — Severe Obstruction
Treadmill test
He is sent for ABI/PVR and arterial duplex revealing ABI 0.5 on left with femoral-popliteal involvement.

Why should we care about his diagnosis of PAD?

Case study
Mortality is very high in patients with severe PAD

Relative 5-year mortality

- Breast cancer\(^1\): 15%
- Colon/rectal cancer\(^1\): 38%
- Severe PAD\(^2\): 44%
- Non-Hodgkin’s lymphoma\(^3\): 48%

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There is a strong two-way association between decreased ABI and increased risk for cardiovascular death.


*Mean participant follow-up 8.3 years
What should we be thinking about in his treatment?

Case study

- Smoking cessation
- Weight reduction
- Total cholesterol <4.5 mmol/L
- LDL cholesterol <2.6 mmol/L
- HbA1c < 53 mmol/mol
- Blood pressure (BP) <140/90 mm Hg
  - For patients with diabetes: BP < 130/80 mm Hg
- Anti-platelet therapy

Risk factor management approach
Effect of Smoking Cessation on Survival in PAD

131 Patients Followed After Bypass Graft or Lumbar Sympathectomy Surgery

Treatment of PAD
Effect of Exercise Training

*Meta-analysis of 21 Studies*

Exercise for PAD?

Offer supervised exercise training should be the initial treatment

- 30-45 minute sessions
- 3 or more times per week
- At least 12 weeks
Effect of Antiplatelet Therapy on Cardiovascular Events in PAD

• 42 clinical trials
• 9,214 patients with PAD
• 23% reduction in serious adverse vascular events ($P=0.004$)
• Benefits similar among PAD subtypes (intermittent claudication, peripheral grafting, and peripheral angioplasty)

Recommendations for Antiplatelet and Antithrombotic Drugs

• Antiplatelet therapy is indicated to reduce the risk of MI, stroke, and vascular death in symptomatic PAD

• Aspirin 75mg daily is recommended as an effective antiplatelet therapy

• Clopidogrel (75 mg per day) is recommended as an alternative antiplatelet therapy to aspirin
Risk Reduction with ACE-inhibitors, Statins, and Antiplatelet Therapy in PAD

<table>
<thead>
<tr>
<th>Trial</th>
<th>Drug</th>
<th>Event Rate (%)</th>
<th>No. of Patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>APTC*</td>
<td>Placebo</td>
<td>6.0%</td>
<td>(&gt;9000)</td>
</tr>
<tr>
<td></td>
<td>Aspirin</td>
<td>4.9%</td>
<td>(&gt;6000)</td>
</tr>
<tr>
<td></td>
<td>Clopidogrel</td>
<td>3.7%</td>
<td></td>
</tr>
<tr>
<td>CAPRIE*</td>
<td>Placebo</td>
<td>4.4%</td>
<td>(4051)</td>
</tr>
<tr>
<td></td>
<td>Ramipril</td>
<td>3.4%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Placebo</td>
<td>4.4%</td>
<td></td>
</tr>
<tr>
<td>HOPE*</td>
<td>Placebo</td>
<td>4.9%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ramipril</td>
<td>3.4%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Placebo</td>
<td>6.1%</td>
<td></td>
</tr>
<tr>
<td>HPS*</td>
<td>Placebo</td>
<td>4.9%</td>
<td>(2701)</td>
</tr>
<tr>
<td></td>
<td>Simvastatin</td>
<td>4.9%</td>
<td></td>
</tr>
</tbody>
</table>

You put him on Atorvastatin 40mg and Aspirin 75mg daily and advised to perform interval exercise training but claudication remains at 100 meters. After three months his symptoms are no better. What should we consider next?

Case study
Treatment Approach to Intermittent Claudication

Assess severity of claudication

Mild to moderate claudication
- Exercise & drug therapy
  - Symptoms improve
    - Continue present therapy
  - Symptoms debilitating

Severe claudication
- Localise lesion
  - Aortoiliac or femoral dz
    - Consider percutaneous intervention
  - Popliteal-tibial dz
    - Exercise & drug therapy unless debilitating
Angiography – occlusion of left popliteal artery with collaterals
Occlusion managed by angioplasty
Left popliteal artery after angioplasty
Occlusion of right common Iliac Artery before and after stent
Revascularization for Aorto-Iliac Arterial Disease

Aortofemoral Bypass

- Primary patency at 5 years of 81-85% \(^1\)
- Perioperative mortality 5-8% \(^1\)
- Reserved for severe diffuse disease cases \(^2\)
- Indicated for Rutherford class \(\geq 3\) \(^2\)

Percutaneous Intervention

- Patency at 5 years of 65-80% \(^1\)
- Perioperative mortality 0.1% \(^1\)
- Treatment of choice \(^3\)
- Indicated for Rutherford class \(\geq 2\) \(^2\)

Summary of PAD and Management

- PAD is common and has a significant impact upon cardiovascular outcomes

- Treatment of PAD, even asymptomatic, should focus on risk factor modification/risk reduction

- Treatment of intermittent claudication should include exercise therapy, drug therapy and selective use of revascularization

- Treatment for critical limb ischemia warrants aggressive efforts at revascularization, including surgery, to reduce the risk of amputation
Overall learning points

PAD is a reliable warning sign that a patient is at high risk for life threatening cardiovascular and cerebrovascular events.

PAD is easily overlooked by both patients and clinicians – assess whether patients presenting with symptoms or associated risk factors have PAD.

Treatments are available to protect the patients with PAD from future MI or stroke.
THANK YOU