Peripheral vascular disease (PVD) is caused by systemic atherosclerosis resulting in narrowing of arteries distal to the aortic bifurcation. Up to 20% of the population aged 55-75 have PVD (defined by an ABI <0.9). The most common disease presentation is intermittent claudication, however >80% of those with the disease are asymptomatic.

Patients with PVD have a 3-4x higher risk of death (mainly from coronary or cerebrovascular events) than age and sex matched controls; reducing cardiovascular risk is therefore a treatment priority.

Venous stasis is the pooling of blood in the legs secondary to: a) congenital or acquired incompetence of superficial valves or deep valves b) weakness, congenital absence or thrombotic damage of deep valves c) outflow obstruction or d) muscle dysfunction.

**Definitions**

**Ankle brachial index (ABI):** Ratio of Doppler recorded systolic pressure in lower extremity to upper extremity.

**Intermittent claudication:** Cramp-like pain in leg muscles occurring with exercise and subsiding with rest.

### Diagnostic Considerations

<table>
<thead>
<tr>
<th>Risk factors for PVD:</th>
<th>Risk factors for venous stasis:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smoking (greatest modifiable risk factor), diabetes, hypertension, hyperlipidemia, male, age &gt; 60, ischemic heart disease/ cerebrovascular disease, obesity, sedentary lifestyle, chronic renal insufficiency, family history of heart disease, elevated CRP, hyperhomocysteinemia</td>
<td>Female, family history, sedentary lifestyle, obesity, age, history of deep vein thrombosis, smoking, occupation with prolonged standing or walking</td>
</tr>
</tbody>
</table>

### Venous Stasis:

**History**

- Leg pain, heaviness, pressure, burning, pruritus, fatigue, restlessness, nocturnal cramps
- Symptoms worse with exercise or standing and relieved with elevation
- Other associated signs: Varicose veins, lipodermatosclerosis, atrophie blanche, stasis dermatitis, ulceration medial ankle/ lower calf

**Physical Examination**

- Telangiectasias, edema, varicose veins, hyperpigmentation, dermatis, lipodermatosclerosis, venous ulceration
- Pulses usually palpable (Doppler may be required)

**Diagnosis**

- Usually a clinical diagnosis
- Colour duplex ultrasound can be used to confirm the diagnosis
- Other testing options less commonly used include: magnetic resonance venography, photoplethysmography and air plethysmography

### PVD:

**Screening:** Canadian Cardiovascular Society (CCS) recommends screening men > 40, postmenopausal women or women >50 and patients with CV risk factors using history and physical examination. If patients screen positive on history/physical, ABI is indicated. Also consider ABI in smokers or diabetics > 40 who screen negative on history/physical.

**History (Edinburgh Claudication Questionnaire)**

(Sensitivity 91.3% [95 CI 88.1-94.5], specificity 99.3% [95 CI 98.9-100])

- Leg pain with walking; pain does not begin while standing or sitting
- Pain can start or worsen while walking fast or uphill
- Pain resolves within 10 minutes of standing still
- Typical location: calf pain. Atypical location: thigh or buttock pain.

**Physical Examination**

- Absent or decreased pedal pulses (LR= 9-44.6), femoral artery bruit (LR=5.7), cool skin (LR=5.8), poor hair growth, abnormal skin color-pale, red, blue (LR=2.8)

**Diagnosis**

- ABI
- Dupplex U/S, MR angiography, CT angiography
- Labs once diagnosed: CBC, FBG or HgA1C, lipids, Cr, urinalysis
### Differential Diagnosis of PVD

<table>
<thead>
<tr>
<th>Condition</th>
<th>Pain Location</th>
<th>Character</th>
<th>Alleviating</th>
<th>Aggravating</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spinal stenosis</td>
<td>Hip, thigh, and gluteal</td>
<td>Cramping, tightness, tingling</td>
<td>Lumbar flexion/ rest</td>
<td>Exercise/prolonged standing</td>
<td>Weakness may be present, history of lower back problems</td>
</tr>
<tr>
<td>Nerve root compression</td>
<td>Posterior</td>
<td>Sharp stabbing</td>
<td>Changing position</td>
<td>Worse after exercise</td>
<td>History of back problems</td>
</tr>
<tr>
<td>Chronic compartment syndrome</td>
<td>Calf muscles</td>
<td>Tight throbbing</td>
<td>Rest/ elevation</td>
<td>Worse with excessive exercise</td>
<td>Can occur in athletes after strenuous exercise</td>
</tr>
<tr>
<td>Foot arthritis</td>
<td>Foot and arch</td>
<td>Aching</td>
<td>Non-weight bearing; rest</td>
<td>Worse with exercise</td>
<td></td>
</tr>
<tr>
<td>Hip arthritis</td>
<td>Hip, thigh, gluteal</td>
<td>Aching</td>
<td>Sitting, rest</td>
<td>Worse with exercise</td>
<td></td>
</tr>
</tbody>
</table>

Others to consider: acute embolism, venous thrombosis, restless legs syndrome, vasculitis, nocturnal leg cramps, muscle/tendon strain, peripheral neuropathy, baker cyst

**Progression of PVD:**
- **Acute ischemia** - pain, pulseless, pale, paresthesia, paralysis
- **Critical ischemia** - rest and night pain, gangrene, ulceration

### MANAGEMENT

**PVD:** Over a 5 year period, 70% report no change or improvement in symptoms with conservative management, 20-30% need an intervention due to increasing severity of symptoms, <5% need amputations. However, over a 5 year period, 5-10% have an MI or stroke and an additional 30% will die (usually from cardiovascular causes).

**Goals:** A) improve maximum walking distance and pain-free walking distance B) improve function C) decrease CVD risk

**Interventions:**

- Quit smoking
- Supervised exercise programs (allow development of collateral vessels to perfuse ischemic tissue) –studies have shown 50-200% improvement beyond baseline walking distance
- Antiplatelets (i.e. ASA 81-325mg/day has been shown to reduce the risk of stroke, non-fatal MI, death from vascular causes; cilostazol may be considered as an alternative in select patients that are not able to take ASA)
- Lipid control (RCTs show improvement in pain free walking distance, decreased worsening of claudication & prevention of CVD)
- Hypertension control (especially use of ACE inhibitors such as Ramipril)\(^1\)
- Blood glucose control in patients with diabetes

*Evidence for efficacy of Pentoxifylline (rheologic modulator) is limited thus it is currently not recommended for routine use

*Cilostazol (phosphodiesterase III inhibitor) has been shown to improve mean walking time and pain free walking distance however it is currently not available for use in Canada

Refer for surgery/intervention if: severe functional limitation and failure to respond to exercise/medication OR chronic critical limb ischemia OR emergency treatment for acute limb ischemia.

**Options:**
- Endovascular stent, intra-arterial thrombolytic, angioplasty +/- brachytherapy, bypass graft, amputation.

**VENOUS STASIS:** Leg elevation (30min TID at heart level), exercise (daily walks + plantar flexion), compression (see table below):

<table>
<thead>
<tr>
<th>Compression</th>
<th>Indications</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;15mmHg</td>
<td>Minimal, for comfort</td>
</tr>
<tr>
<td>15-20mmHg</td>
<td>Minor varicosities or ankle/leg/swelling, tired legs</td>
</tr>
<tr>
<td>20-30mmHg</td>
<td>Moderate to severe varicosities or swelling, phlebitis, post vein ablation</td>
</tr>
<tr>
<td>30-40mmHg</td>
<td>Severe varicosities or swelling, active ulceration, post DVT or operation</td>
</tr>
<tr>
<td>40+mmHg</td>
<td>Lymphedema</td>
</tr>
</tbody>
</table>

If signs/symptoms severe or unresponsive to medical treatment in 6 months, consider venous ablation: minimally invasive chemical (sclerotherapy), thermal (radiofrequency, laser) or mechanical removal (surgical stripping).

**Stasis dermatitis:** Emollient and/or barrier cream +/- mid potency corticosteroid.

**Venous ulcers:** Wound debridement, ulcer dressing, ASA may accelerate healing, consider pentoxifylline for healing acceleration in select patients.\(^10\)


**Bottom Line:** PVD (ABI<0.9) is usually asymptomatic or can present as intermittent claudication. Screen all men>40, women >50 and patients with CV risk factors. Treatment goals include improving function and decreasing CVD risk. Venous stasis is a clinical diagnosis. The mainstay of treatment is conservative- leg elevation, exercise and compression.

References can be found online at http://www.dfcm.utoronto.ca/programs/postgraduateprograme/One_Pager_Project References.htm