

Aaron Jay Yang and Nitin B. Jain

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## Introduction

- Patients with predominantly lower extremity limb pain may have underlying vascular disease from thrombosis or vascular claudication. The axillary, calf, and femoral veins are common sites of thrombosis and it is important to take into consideration a history of clotting disorders such as Factor V Leiden, antiphospholipid syndrome, protein C or S deficiencies, and antithrombin III deficiency. Symptoms related to vascular claudication may first be noticed with exercise or prolonged walking and may mimic musculoskeletal diseases or symptoms closely resembling neurogenic claudication from spinal stenosis. The goals of the physical examination should be to establish quality and presence of pulses and to identify the presence of bruits, venous disease, signs of ischemia, or presence of an aneurysm.

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## Physical Examination

- Examination should follow this sequence: observation, auscultation, and palpation.
- **Observation** should include any signs of gangrene, blackening of the extremities, and presence of ulcers. Careful observation should be performed in the legs and feet including behind the ankle and between the toes. Each limb should be observed for ischemic signs including color, capillary refill, temperature, and ulceration. Capillary refill should be checked at the nail bed with normal refill occurring less than 2 s.
  - Venous signs include brawny coloration, ulceration, varicose veins, and edema.
  - The 5 “P’s” for signs of acute ischemia include pulseless, pallor, paresthesia, paralysis, and poikilothermia. Nerves are most susceptible to acute ischemic injury followed by muscle and tendon and bone.
  - Chronic ischemia can lead to skin changes which can include loss of hair, abnormal nail growth or fungus formation, and thin, dry skin.
- Ulcers can also signify poor blood supply and can be arterial or venous in nature.
  - Arterial ulcers are distal in location with sharp margins and often associated with no pulse and can be painful.
  - Venous ulcers are often located around the malleolus with irregular margins and associated with normal pulses and can vary in terms of pain presentation.

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A.J. Yang, MD (✉) • N.B. Jain, MD, MSPH  
Department of Physical Medicine and Rehabilitation,  
Vanderbilt University Medical Center,  
2201 Children’s Way Suite 1318, Nashville,  
TN 37212, USA  
e-mail: [aaron.yang@vanderbilt.edu](mailto:aaron.yang@vanderbilt.edu)

- **Auscultation** should be performed over areas in which bruits might be present. Bruits are caused by turbulent arterial blood flow through a narrowed portion of the artery. Locations to auscultate for bruits include the carotid, aorta, and femoral arteries.
- **Palpation** should include checking for pulses. Pulses should be palpated at the dorsalis pedis, posterior tibialis, femoral, popliteal, and carotid arteries. Abdominal examination should also include careful palpation to rule out an aortic aneurysm.
- The following are **special tests** that can be used to assess for patients with peripheral vascular disease and arterial insufficiency.
  - Ankle brachial index assesses for presence of peripheral vascular disease. This test can be unreliable in patients with calcified arteries or in those with edema. This index is calculated by dividing the systolic blood pressure of the ankle by the pressure in the arm. Normally, the pressure at the ankle is slightly higher than at the elbow with normal values ranging between 0.9 and 1.2. Any value less than 0.4–0.5 requires urgent referral to a vascular specialist.
  - Buerger’s test for arterial insufficiency. The patient is placed in the supine position and the color of the feet and soles is noted (should typically be pink). The legs are elevated to 45° or more for 1 min and then

the color of the soles should be reassessed. If there is marked pallor then ischemia should be suspected. The angle in which pallor is first noted is also known as the vascular angle and an angle of less than 20° indicates severe ischemia. The patient can then be sat upright and it can be noted how quickly the soles of the feet regain their pink color.

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## Questions

- What are the 5 “P’s” of acute ischemia? Pulseless, pain, pallor, paresthesia, paralysis, and poikilothermia.
- What would an ABI of >1.2 signify? Abnormal blood vessels due to severe peripheral vascular disease or significant calcification.
- What type of ulcers is more commonly painful? Arterial ulcers which are also more sharply demarcated and distal in location.

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## Suggested Reading

McGee SR, Boyko EJ. Physical examination and chronic lower-extremity ischemia: a critical review. Arch Intern Med. 1998;158(12):1357–64.