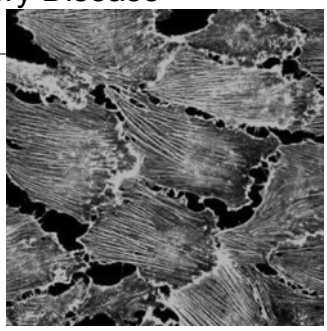
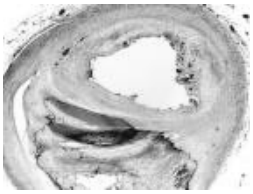
Peripheral Artery Disease



Outline

- Prevalence
- Signs and symptoms
- Methods of Evaluation
- Exercise in Treatment



Peripheral Artery Disease

- A form of atherosclerosis
  - Similar risk factors
  - Associated with diabetes, HTN, smoking, hyperlipidemia
- Cause of serious disability
- Increases with age
- Less common in women (before menopause)
- Affects 12% of population
  - 20% of older population

Signs and Symptoms

- Exercise-induced muscle aching or cramping (intermittent claudication) caused by muscle ischemia
- Early in disease, pain occurs only with walking
- Late in disease, pain occurs at rest
- Advanced stages: ulceration, gangrene and amputation of toes or legs

Risk Factors: same as CAD

- Established
  - Family history
  - Hypercholesterolemia
  - Hypertension
  - Current cigarette smoking
  - Impaired fasting glucose
  - Obesity
  - Physical inactivity
  - Aging

Risk Factors

- New / Emerging
  - Inflammatory markers (CRP)
  - Homocysteine
  - Lipoprotein (a)
  - Fibrinolytic factors
  - Clotting factors
  - Acute post-prandial hypertriglyceridema
  - Infectious agents
  - Metabolic syndrome
  - Estrogen deficiency/ post-menopausal status
  - Genetic factors
  - Psychosocial stress
  - Others

Assessment

- ABI: Ankle-Brachial Index
  - Measure blood pressure in the ankle and arm using Doppler ultrasound
  - Measure at rest and just after exercise

Abnormal ABI is < 0.9 at rest and a 20% decrease after exercise

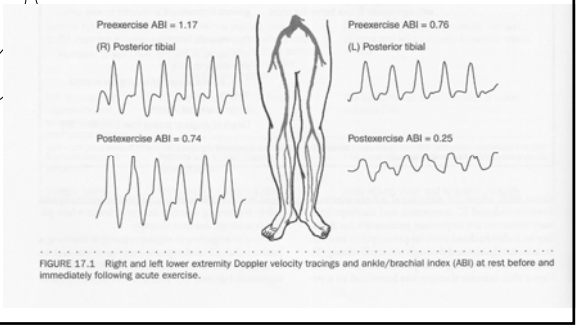


FIGURE 17.1 Right and left lower extremity Doppler velocity tracings and ankle/brachial index (ABI) at rest before and immediately following acute exercise.

Other assessment methods

- Check for pulse in ankle and toe
- Oximetry
- Reactive hyperemia testing
- Neurological tests for damage to feet and legs
- Exercise testing
- Symptom scales

Fontaine Scale

- Fontaine Stages
  - I, asymptomatic
  - II, mild claudication
  - IIb, moderate-severe claudication
  - III ischemic rest pain
  - IV, ulceration, gangrene

Rutherford categories

- 0, asymptomatic
- 1, mild claudication
- 2, moderate claudication
- 3 severe claudication
- 4, ischemic rest pain
- 5, minor tissue loss
- 6, major tissue loss

Causes??

- Occlusive atheroschlerosis
- Endothelial dysfunction
- Thrombosis

Pre-Screening for PAD

- First step: screen for CAD
  - Functional capacity may be very low
  - To obtain sufficient myocardial stress
    - initial CAD screening test may need to be performed with arms and legs
    - arms only
    - Pharmacological stress test

Treadmill PAD Testing

- Treadmill test is useful at beginning of rehab to assess progress
  - Must use slower speed and less rapid increase in grade
- Performance Measurement
  - Claudication-free walking time or distance
  - Maximum claudication–limited time or distance

Example Treadmill Protocols

- Constant Load
  - 1.5-2.0 mph, 8-12% grade
- Graded protocols
  - Speed is 2.0 mph
  - Grade is increased by 2 or 3.5% every 3 minutes

Treatments for PAD

- Surgery or angioplasty
  - Only for most severely affected (<5%)
- Drugs
  - only modest improvements
  - Pentoxifylline (decrease blood viscosity)
  - Anti-platelet and vasodilating drugs
  - Verapamil
- Diet
  - Lipid lowering diet
- Exercise**

Rehab Exercise for PAD

- Exercise is highly effective
  - 2-3 fold increase in walking distance
  - 15-30% increase in VO2pk
  - Improved walking ability with less pain
  - Improved perception of physical function
  - Increased level of habitual activity

Mechanism(s) of improvement with exercise

- Improved muscle blood flow and increased collateral vessels is only a minor effect
- Improved biomechanics
- Reduced blood viscosity
- Decreased red cell aggregation
- Regression of atheroschlerosis
- Improved sk muscle oxidative metabolism
- Increased pain tolerance

Exercise Prescription

- Mode
  - Walking
- Schedule
  - 3-5/wk, for 1 hr
- Protocol
  - Warm up and cool down
  - Start with 5 min of intermittent walking, working up to 35 min in a 50-min session
  - Patient walks until mild/mod pain, then rests until pain abates

Exercise Rehab, cont.

- Supervised exercise is recommended, with EKG monitoring for patients with CAD
- However, insurance often does not cover exercise for PAD patients
- Self-prescribed, preferably daily, working to 2000kcal/wk is recommended
  - Pedometers and accelerometers may be helpful

Resistive Exercise

- Less evidence of effectiveness
- Muscle groups of lower body
- 8-10 reps over full range with slower eccentric movements
- 1-3 sets
- 3/wk
- Slow progression

Exercise controversy

- Should exercise should be prescribed for patients with advanced PAD?
  - Anti-oxidant capacity and renal function may be abnormal after exercise
  - Increased thrombin formation in PAD?
- Some physicians recommend drug therapy against endothelial damage following exercise (pentoxifylline)

Case Study: from Ehrman

- 61-yr old African American female
- Complains of right leg pain for > 8 months
- Intermittent tingling in right foot and buttock and thigh pain with walking
- Can walk 50 ft before leg symptoms
- No angina, but previous bypass and valve replacement, and EF of 35%
- HTN history, diabetes, former smoker, family history of CAD, dyslipidemia

Case study, cont.

- Physical exam
  - Heathy-appearing middle-aged woman
  - BP 118/70 and HR 80
  - Femoral, popliteal, and pedal pulses are absent on right extremity
  - Right foot is warm with delayed capillary filling
  - ABI on right foot is 0.75 and drops to 0.51 after exercise
  - Abnormal right foot ultrasound waveforms and pressures

Diagnosis

- PAD of her right leg
- Treatment
  - Lose 25-30 lbs
  - High fiber, low cholesterol diet
  - Intermittent exercise
    - Walking hallways of her apt complex
    - Walk until mild leg pain, but stop if chest pain

Final Thoughts

- PAD is much more common than the statistics suggest
  - 5 times more cases when screening is performed
- Another reason why people don't exercise?
- Another reason why people should exercise.