Vascular Conditions

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Peripheral Vascular Disease

Vascular disease outside of the heart and brain

Narrowing of vessels carrying blood to:
- Legs
- Arms
- Stomach
- Kidneys

Peripheral Vascular Disease

- Two Types
  - Functional
    - Example — Raynaud's disease
      - No structural defect in vasculature
      - Caused by spasm
      - Short term effects
  - Organic
    - Example — peripheral artery disease
      - Structural changes of vasculature
      - Inflammation
      - Tissue damage
      - Atherosclerosis

Peripheral Vascular Disease

- Incidence
  - 10 million Americans
  - 5 million are asymptomatic
  - 2.5 million undiagnosed
  - 2.5 million are treated (2.1 million medically managed)
  - Increases with age (1/3 of adults over 70)

Peripheral Vascular Disease

- Symptoms
  - Claudication
  - Numbness or tingling in feet
  - Burning or aching pain
  - Ischemic ulceration
Peripheral Vascular Disease

• Symptoms
  – Change in color of skin
  – Loss of hair on legs
  – Gangrene

Peripheral Vascular Disease

• Risk Factors
  – >50 years old
  – Smoker
  – Diabetic
  – High blood pressure
  – Overweight
  – High cholesterol, atherosclerosis
  – Family history

PVD - Diagnostic Tests

• Doppler ultrasound

PVD - Diagnostic Tests

• Angiography

PVD - Diagnostic Tests

• Magnetic Resonance Imaging
  – Magnetic Resonance Angiography (MRA)
Ankle-Brachial Index

- Why is it ordered?
- Indicator of arterial occlusion
- How is it calculated?
  - SBPA / SBPB = ABI
  - SBPA = 90; SBPB = 120;
  - ABI = 90/120 = 0.75

How is it interpreted?
- ABI= 1-1.3 Normal: No PAD
- ABI = 0.8-0.99 Mild blockage: Beginning PAD
- ABI = 0.5-0.79 Moderate blockage: Pain with exercise
- ABI < 0.5 Severe blockage: Pain at rest
- ABI < 0.25 Potential for limb loss

PVD – Treatment

- Medical Management
  - Lifestyle Changes
  - Pharmacologic
    - Aspirin
    - Clopidogrel or Ticlopidine
    - Cilostazol
    - Heparin
    - Lipid Lowering drugs

- Invasive Procedures
  - Angioplasty / stents
  - Surgery
    - Atherectomy
    - Bypass

Treatments: Thrombolytics

- Retavase (Retaplaste) or Tenecteplase (TNK)
- Converts plasminogen to plasmin, a natural fibrinolytic
- Thrombolytic drips directly onto the clot
- Heparin infusion also given
- May need additional balloon angioplasty and/or stent

PVD – Treatment

- Surgery is named by artery(s) that are bypassed
  - Examples – Fem/Fem, Fem/Pop,
Post-op Assessment
- Vital signs
- Pulmonary
- Fluid Balance (Urine output)
- Bedrest
- Neurovascular checks

Post-op Complications
- Graft thrombosis
- Hemorrhage
- Edema
- Lymphatic Edema
- Infection

Graft Thrombosis
- Inadequate arterial flow
- Clamp Injury
- Decreased cardiac output
- Vasospasm
- Thromboemboli

Complications after Reperfusion
- Reperfusion injury
- ATN
- Rhabdomyolysis
  - Tissue breakdown releases myoglobin into plasma
  - Can overwhelm renal system and lead to kidney failure
  - Differential diagnosis: CPK ≥ 5 times normal
  - Treatment: Fluid load to maintain urine output of 100 ml/hr.
    - Alkalize urine with NaHCO3
  - Lactic acidemia

Complications
- Compartment syndrome
- Venous thrombosis
- Pulmonary embolus
- Graft infection

Graft Infection
- Signs and Symptoms
  - Incisional swelling
  - Local tenderness
  - Drainage
  - Pulsatile mass
  - Diminished pulses
  - Leukocytosis
  - Fever
Carotid Artery Disease

• Probable Causes
  – Atherosclerosis
  – HTN

• Risk Factors
  • Age
  • Hyperlipidemia
  • Diabetes
  • Hypertension
  • Smoking
  • Obesity
  • Sedentary lifestyle
  • Family history of atherosclerosis

CAD – Diagnostic tests

• Hx and Physical – look for stroke symptoms
• Ultrasound
• Arteriography (MRA)

CAD – Treatment

• Lifestyle Modification
• Medications
  – ASA
  – Gradual lowering of BP

• Clinical Manifestations
  – TIA
  – RIND – Reversible Ischemic Neurological Deficit
  – Amaurosis fugax – Transient blindness caused by microemboli to retina
### CAD Treatment Continued

- **Procedures**
  - Carotid Stenting
    - Combined with medical management:
      - Aspirin and/or Plavix
      - Blood Pressure control

### CAD Treatments

- **Surgical**
  - Carotid Endarterectomy

### Post-op Care

- **Watch for potential complications**
  - Hemorrhage (hematoma)
    - **Causes**
      - Anticoagulation
    - **Dangers**
      - Obstruction of airway
      - Sign - Hoarseness

### Post-op Care

- **Watch for potential complications**
  - Cranial Nerve damage
    - Facial
    - Glossopharyngeal
    - Superior Laryngeal
    - Hypoglossal

### Post-op Care

- **Watch for potential complications**
  - Perioperative Stroke
  - Wound Complications
  - Recurrent carotid stenosis
  - Pulmonary complications

### Post-op Care

- **Labile Blood Pressure**
- **May have arterial line**
  - Hypertension
  - Nipride
Abdominal Aortic Aneurysm

• Aneurysm Development
  – Atherosclerosis
  – Trauma
  – Arteritis (Infection)
  – Congenital abnormalities (Marfan's)

• Risk Factors
  – Age
  – Male
  – Caucasian
  – Smoking
  – Diabetes
  – Hypertension
  – Family History

• Clinical Manifestations
  – Asymptomatic
  – Severe Abdominal Pain

• Diagnostic Tests
  – History and Physical
    – Echocardiogram
    – CT

• Monitor

• Surgery
  – Percutaneous (Closed)
    Stent graft
  – Open

AAA Treatments
AAA Post-op Care

- Systemic Heparinization
- Postoperative Hypertension

AAA Post-op Care

Post-operative Hypotension
- Causes –
  - Rewarming
  - Third spacing of fluids
  - Blood loss
  - Cardiac dysfunction

AAA Post-op Care

- Vasoactive Medications
  - Dopamine
  - Nipride
  - Dobutamine

AAA Post-op complications

- Cross clamping injuries
  - Renal failure
  - Bowel Ischemia
    - Small areas to transmural necrosis
    - Can lead to acute perforation
  - Signs/symptoms
    - pain
    - diarrhea
    - abdominal distention
    - fever

AAA Post-op complications

Hypo-perfusion of lower extremities
Paralysis
Graft occlusion

Other aortic aneurysms

- Type A: Ascending Aortic Aneurysm—begins in ascending aorta and moves to chest
- Type B: Descending Aortic Aneurysm—begins in descending aorta and moves to either chest or abdomen or both
- Thoracic Aortic Aneurysm
- Thoraco-abdominal Aortic Aneurysm
- Abdominal Aortic Aneurysm