

# *Vascular Disease*

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## *Abdominal aortic aneurysm*

- more common than thoracic aortic aneurysm
- commonly old men
- etiology = atherosclerosis, genetic and cellular
- symptoms = majority asymptomatic. Pain over lower abdomen or lower back, palpable pulsatile abdominal mass. Ruptured aneurysm → sudden new worsening pain, hemorrhagic shock, retroperitoneal hemorrhage, death (mortality high)
- Diagnosis = abdominal ultrasonography, abdominal CT, aortography, magnetic resonance angiography (MRA).
- Treatment = percutaneous endovascular stent-graft or surgical repair (if aneurysm > 5 cm diameter)

## *Thoracic aortic aneurysm*

- Etiology = cystic medial degeneration (eg. Marfan syndrome), atherosclerosis, syphilis, infection, arteritis etc.
- Symptoms = 40% asymptomatic. Local mass effect (eg. cough, dyspnea, hemoptysis, dysphagia, hoarseness, chest and back pain, tracheal deviation, superior vena cava syndrome etc.) Vascular consequences (eg. aortic regurgitation, heart failure, thromboembolism causing stroke, limb ischemia etc.)  
Ruptured aneurysm → sudden new worsening pain, shock, death (mortality high).
- Diagnosis = chest X-ray and CT, aortography.
- Treatment = percutaneous endovascular stent-graft or surgical repair (if ascending thoracic aortic aneurysm > 5.5 cm, descending thoracic aortic aneurysm > 6 cm, or > 7 cm in high operative risk patients )

# *Aortic dissection*

- Tear in aortic intima → blood penetrate media and hence dissection. Or rupture vasa vasorum → intramural hematoma and hemorrhage and hence dissection.
- Etiology = medial degeneration, age, congenital, hypertension, arteritis, trauma etc.

- Classification of aortic dissection :

DeBakey type I = involve ascending, arch  
and descending aorta

II = involve ascending aorta

III = involve descending aorta

Stanford type A = involve ascending aorta

B = not involve ascending aorta

Descriptive: proximal dissection = DeBakey I and  
II or Stanford A

distal dissection = DeBakey III or Stanford B

- **Symptom** = severe sudden tearing stabbing pain over chest, interscapular, neck, throat, jaw, back, abdomen, lower extremities. Hypo or hypertension, pulse deficit, difference in right and left arm blood pressure, murmur of aortic regurgitation, focal neurological deficits.
- **Complication** = heart failure, syncope, stroke, paraplegia, cardiac arrest, sudden death, acute myocardial infarction, acute renal failure, mesenteric ischemia etc.
- **Diagnosis** = aortography, contrast-enhanced CT, MRI, transthoracic and transesophageal echocardiography

- Therapy = **proximal dissection** : surgical repair

### **Uncomplicated distal dissection:**

medical therapy to maintain blood pressure < 130 mmHg systolic using beta blockers, ACEI, verapamil, diltiazem. Pure vasodilators (dihydropyridine calcium blocker, hydralazine) may be used only in conjunction of adequate beta blockade.

If **complicated** by rupture, aneurysm formation, aortic regurgitation, arterial occlusion, extension or recurrence of dissection → surgical repair

# *Atypical aortic dissection*

## ■ *Intramural hematoma of aorta*

= hemorrhage within media of aorta  
(rupture of vasa vasorum) → crescentic  
high-density thickening of aortic wall

## ■ *Penetrating atherosclerotic ulcer*

= ulceration of atherosclerotic lesion of  
aorta → hematoma within media →  
localized outpouching of aorta

- Medical therapy for uncomplicated distal hematoma. Surgical repair for complicated distal or proximal hematomas.

# *Peripheral arterial disease*

- Atherosclerotic arterial disease in vessels of lower or upper extremities, which may be asymptomatic, symptomatic with exertion (“leg angina”), or symptomatic at rest.
- Potently associated with risk factors (and risks) of coronary artery disease and cerebrovascular disease, such as age, diabetes, smoking, hypertension, obesity, hyperlipidemia, homocysteine, fibrinogen, blood viscosity, c-reactive protein etc.

## *Clinical features*

- Most common symptom = “intermittent claudication” (=cramping, aching, fatigue, discomfort in calf, thigh or buttock, elicited by walking and relieved by rest)
- “Rest pain” = pain at rest in patients with critical limb ischemia (metabolic need not adequately supplied by circulation)
- diminished pulses, bruits.
- Skin color changes, ulceration, infection, pedal edema, gangrene



# *Diagnostic tests*

- **Ankle-brachial index (ABI)** = ratio of ankle to brachial systolic blood pressure
  - normal ABI  $> 0.9$ . If  $\leq 0.9 \rightarrow$  peripheral arterial disease
- Doppler ultrasound
- Magnetic resonance angiography (MRA)
- Contrast angiography

# Therapy

- Risk factor modification and exercise rehabilitation (increase collateral development)
- Medical treatment:
  - Pentoxifylline** (decrease platelet aggregation and fibrinogen level, improve red blood cell deformability, antiinflammatory and antiproliferative effects)
  - Cilostazol** (antiplatelet and vasodilator, inhibits phosphodiesterase III therefore contraindicated in heart failure)
- Surgery: percutaneous transluminal angioplasty (PTA), bypass surgery

# *Acute limb ischemia*

- Occur when blood flow to arm or leg suddenly occluded → claudication, rest pain, sensory loss and motor dysfunction (due to ischemia of peripheral nerves). 5Ps = pain, pulseless, pallor, paresthesia, paralysis
- Etiology = arterial embolism, thrombosis in situ, dissection, trauma, procoagulant disorders (eg. antiphospholipid antibody syndrome, protein C or S deficiency, hyperhomocysteinemia etc.)
- Treatment = heparin, catheter-directed intraarterial thrombolysis, surgical thromboembolectomy and bypass.

# *Critical limb ischemia*

- Chronic ischemic rest pain, ulcer or gangrene due to occlusive arterial disease.
- Risk factors = smoking (most important), diabetes, hyperlipidemia, hypertension
- Symptoms = skin color and trophic changes, diminished pulses, burits
- Diagnosis = ABI, doppler ultrasound, MRA, angiography
- Treatment = analgesics, antibiotics, heparin, prostanoids, endovascular or surgical intervention.

# *Vasculitis and Vasospasm*

## *Buerger's disease (thromboangiitis obliterans)*

- Segmental vasculitis affecting distal vessels and nerves of upper and lower extremities.
- Typically occurs in young heavy smoking male
- Etiology unknown
- Symptoms = claudication of hands, forearms, feet or calves, pain at rest and digital ulceration, Raynaud phenomenon, superficial thrombophlebitis
- Treatment = stop smoking, analgesics, calcium blocker, catheter-directed thrombolytic therapy, sympathectomy, surgical bypass

## *Takayasu arteritis*

- Idiopathic arteritis affecting aorta and its major branches
- Common in young women
- Symptoms = extremity or visceral ischemia, weakness, myalgia, arthralgia, night sweat, fever, aortic root involvement → valvular insufficiency, angina, heart failure
- Treatment = steroid, immunosuppressive, surgery

## *Giant cell arteritis*

- Common in old women
- Symptoms = new onset atypical severe headache. Scalp and temporal artery tenderness, erythema and nodularity. Acute visual loss, jaw claudication, polymyalgia rheumatica, aortitis, transient ischemic attack or stroke, aortic aneurysm
- Treatment = steroid, immunosuppressive.

# *Kawasaki disease*

*(mucocutaneous lymph node syndrome)*

- Vasculitis involving large, medium or small arteries especially coronary artery
- Symptoms = fever, rash, peripheral extremity changes (erythema, edema), bilateral conjunctival infection, oral mucous change (fissured lips, strawberry tongue), cervical lymphadenopathy
- Complications = carditis (50%), myocardial infarction (due to coronary artery aneurysm and thrombosis)
- Treatment = aspirin, gamma globulin.



# *Raynaud Phenomenon*

- **Episodic attack of well-demarcated blanching or blue discoloration of one or more fingers or toes, especially on exposure to cold or emotional upsets.**
- **Etiology = vasospasm as idiopathic (primary) or secondary to underlying diseases (eg. SLE, scleroderma, polymyositis, carpal tunnel syndrome, traumatic vasospastic disease, thoracic outlet syndrome, obstructive arterial disease, blood abnormalities, vasculitis etc.), drugs (eg. beta blocker, ergot, amphetamine, imipramine, cyclosporine etc.) or inciting event.**
- **Treatment = keep hand and feet warm and dry. Avoid situations which induce vasospastic attacks. Drug therapy (calcium blocker, prazosin, nitroglycerin ointment, ACEI, thyroid replacement, prostaglandin etc), sympathectomy, surgical resection or bypass of thrombosed digital vessels.**

# *Veins and lymphatics*

## *Deep vein thrombosis (DVT)*

- Mostly affect lower limb
- High risk to develop pulmonary embolism
- Diagnosis = contrast venography, impedance plethysmography, doppler ultrasonography
- Risk factors = blood hypercoagulability (eg. antithrombin III, protein C and S deficiency, hyperhomocysteinemia etc), lupus anticoagulant, polycythemia, cancer, nephrotic syndrome, age, obesity, venous stasis (eg. heart failure, myocardial infarction, cardiomyopathy etc), oral contraceptive, pregnancy, sepsis, immobilization, surgery, trauma, stroke, inflammatory bowel disease etc.

- Symptoms = painful swollen lower limb, redness, gangrene, palpable cord of thrombosed veins, discoloartion, mottled cyanosis etc.
- Treatment = anticoagulant, thrombolytic agents, surgery

### ***Varicose Vein***

- Risk factors = female, age, pregnancy, family history, obesity, prolonged standing etc.
- Treatment = compression therapy, drugs (pentoxifylline, prostaglandin, diuretic, antibiotic etc), surgery

# *lymphedema*

- Tissue swelling due to failure of lymph drainage
- Etiology = primary lymphedema (= intrinsic abnormalities of lymphatic) eg. absence of peripheral lymphatic (Milroy's disease), hypoplasia of peripheral lymphatic. Secondary lymphedema eg. inflammation, infection, injury, malignancy
- Symptoms = change in skin and subcutaneous tissue, edema (not responsive to elevation and diuretic)
- Diagnosis = lymphangiography, lymphography
- Treatment = lymphedema is end stage failure of lymph drainage and irreversible. Skin care, compression, exercise, massage, prevent inflammation and infection, diuretic, surgery.