The Society for Vascular Technology of Great Britain and Ireland

Vascular Technology

Syllabus 2015

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A. Gross Anatomy (10 %)

Cerebral Arterial System

- Anterior circulation (carotid)
  - Subclavian / aortic arch / brachiocephalic
  - Common carotid
  - Internal carotid (cervical, petrous, cavernous cerebral)
  - External carotid (including 8 branches - superior thyroid, lingual, facial, occipital, posterior auricular, ascending pharyngeal, temporal, internal maxillary)
- Posterior circulation (vertebro-basilar)
  - Vertebral (including branches)
  - Basilar
- Intracranial circulation (circle of Willis)
  - Anterior cerebral
  - Anterior communicating
  - Middle cerebral
  - Posterior communicating
  - Posterior cerebral
  - Basilar
  - Internal carotid
  - Ophthalmic
- Peri-orbital circulation
  - External carotid
  - Temporal artery (including branches)
  - Supra-orbital
  - Ophthalmic from internal carotid
  - Central retinal artery

Central and Peripheral Arterial System (including anatomical variations)

- Aortic arch
  - Common carotid right and left
  - Subclavian
  - Brachiocephalic
  - Ascending aorta
  - Descending aorta
  - Heart
- Upper extremities
  - Subclavian
  - Axillary
  - Profunda brachial
  - Brachial
  - Ulnar
  - Radial
  - Interosseus
  - Palmar arch
  - Deep palmar arch
  - Superficial palmar arch
  - Digital & metacarpal arteries
  - Collateral possibilities
- Thoracic and abdominal arteries
  - Aorta
  - Coeliac
  - Splenic
  - Hepatic
  - Superior Mesenteric

- Renal, including basic structure of the kidney
- Gonadal
- Inferior mesenteric
- Common iliac
- Internal iliac
- External iliac

- Lower extremity arteries
  - Aorta
  - Common iliac
  - External iliac
  - Internal iliac
  - Common femoral
  - Lateral and medial circumflex
  - Profunda femoral
  - Superficial femoral
  - Popliteal
  - Tibio-peroneal trunk
  - Anterior tibial
  - Anterior tibial recurrent
  - Posterior tibia
  - Peroneal
  - Pedal arch
  - Dorsalis pedis
  - Lateral plantar
  - Medial plantar
  - Plantar arch
  - Metatarsal

Venous System (including anatomical variations)

- Central veins
  - Vena cava
  - Superior vena cava
  - Inferior vena cava
  - Brachiocephalic
  - Internal jugular
  - Subclavian
- Portal, mesenteric and renal veins
  - Superior mesenteric
  - Splenic
  - Hepatic
  - Renal
- Lower extremity veins (origins, termination, venous valves, number of valves)
  - Deep veins
    - Inferior vena cava
    - Common iliac
    - External iliac
    - Internal iliac
    - Common femoral
    - Superficial Femoral
    - Profunda femoral
    - Popliteal
    - Calf veins incl. anterior tibial, posterior tibial, peroneal, soleal and gastrocnemius
    - Giacomini veins
  - Superficial veins
    - Long saphenous

        - Short saphenous
    - Perforators
    - Venous sinuses

- Upper extremity veins (including anatomic variants)
    - Deep veins
        - Superior vena cava
        - Brachiocephalic
        - Subclavian
        - Internal jugular
        - Axillary
        - Brachial
        - Radial
        - Ulnar
        - Deep palmar arch
    - Superficial veins
        - Cephalic
        - Basilic
        - Median cubital
        - Median

Microscopic Anatomy, Microcirculation

- Microcirculation (capillaries)
- Arterial wall
- Venous wall
- Venous valves
- Atheromatous plaque

B. Test Validation (3%)

- Statistics
    - Sensitivity*
    - Specificity*
    - Positive and negative predictive value*
    - Accuracy*
    - Observer variance
    - Physiological variation
- Measurement of Stenosis
    - Diameter reduction*
    - Area reduction*

*Candidates will be expected to perform basic calculations in the theory exam

C. Peripheral Arterial Disease (28%)

Epidemiology of Peripheral Arterial Disease

- Epidemiology of atherosclerosis and peripheral arterial disease

Aetiology of Peripheral Arterial Disease

- Atherosclerosis
    - Definition
    - Natural history of atherosclerotic lesions
- Embolism
    - Definition

- Arterial embolism
- Emboli to lower and upper extremities

- Thrombosis
  - Definition
  - Acute arterial thrombus

- Non-atherosclerotic lesions
  - Arteritis

- Vasopastic Disorders
  - Raynauds's Syndrome and Similar conditions
  - Digital Ischaemia and vasopastic disease

- Dissection

Patient History and Physical Examination

- Symptoms
- Skin changes
- Palpation
- Pulses
- Auscultation

Risk Factors and Contributing Diseases

- Age
- Sex
- Race
- Family history
- Smoking
- Diabetes
- Hypertension
- Hyperlipidaemia
- Renal disease
- Combination of risk factors and contributing diseases

Duplex Imaging

- Patient positioning, technique, interpretation, capabilities and limitations
- B-mode – including plaque morphology
- Pulse wave Doppler – including normal & pathological values
- Colour Doppler
- Power Doppler
- Quantative interpretation
  - Pulsatility index
  - Resistive index
  - Transit time
  - Acceleration time / systolic rise time

Lower Limb Arterial Disease (duplex examination, epidemiology, aetiology, risk factors, patient history, physical examination, treatment)

- Chronic arterial occlusive disease
- Assessment of leg ischaemia
  - Pathologic physiology, symptoms
  - Claudication
    - Intermittent claudication, pain
    - Exercise testing

- Specific clinical problems

- ❑ Ischaemic rest pain
- ❑ Critical leg ischaemia
- ❑ Rest pain
- ❑ Tissue loss / necrosis
- ❑ Healing of ulcers and amputations
- ❑ Acute arterial occlusion – thrombosis, emboli, trash foot
- ❑ Aneurysms
- ❑ Popliteal entrapment
- ❑ Iliac Endofibrosis

Upper Limb Arterial Disease (duplex examination, epidemiology, aetiology, risk factors, patient history, physical examination, treatment)

- ❑ Acute & chronic upper limb arterial disease
- ❑ Subclavian steal
- ❑ Thoracic outlet syndrome & other neurovascular compression syndromes
- ❑ Arterial occlusive diseases of the upper extremity
- ❑ Trauma, dissection, vasospasm, vibration, thermal injury
- ❑ Hand-arm vibration Syndrome
- ❑ Upper extremity aneurysms
- ❑ Hypothenar Hammer Aneurysm

Abdominal Arterial Disease (duplex examination, epidemiology, aetiology, risk factors, patient history, physical examination, treatment)

- ❑ Abdominal aortic and iliac artery aneurysms
  - o Dissection
  - o Thrombosis
  - o Stenosis
- ❑ Duplex evaluation for EVAR
  - o Types of Endovascular repair options (e.g. fenestrated grafts, coiling)
  - o Types of Leaks
  - o Endovascular revision options
- ❑ Renovascular hypertension
  - o Renal artery stenosis & hypertension
  - o Duplex evaluation of native renal vessels, inferior vena cava and renal transplants
- ❑ Mesenteric ischaemia
  - o Superior Mesenteric artery
  - o Other mesenteric arteries
  - o Intestinal Ischaemic Syndromes (Acute/Chronic)
  - o Superior Mesenteric Syndrome
  - o Mesenteric Aneurysm
  - o Occlusive diseases

Global Arterial Diseases (duplex examination, epidemiology, aetiology, risk factors, patient history, physical examination, treatment)

- ❑ Non-atherosclerotic lesions
  - o Emboli
  - o Trauma
- ❑ Fibromuscular dysplasia
- ❑ Young patients with claudication
- ❑ Arteritis
- ❑ Vasospastic disorders
- ❑ Raynaud's syndrome and other vascular syndromes related to environmental temperature
- ❑ Cold sensitivity testing
- ❑ Digital ischaemia and vasospastic disease

- Dissection -intimal, medial, spontaneous, traumatic
- Acrocyanosis
- Entrapment syndromes
    - Popliteal Artery Entrapment Syndrome
    - Thoracic Outlet Syndrome
- Arterial syndromes, e.g. Buergers, Takayasu's
- Arteriovenous fistulae
    - Malformations
    - Renal patients
    - Vein Marking

Pressures

- Lower extremity
    - Segmental
    - Resting ankle
    - Stress test
    - Toe pressures
- Upper extremity
    - Arm pressures
    - Digital pressures
- Penile pressures – impotence, varicoele

Other Non-invasive Tests (patient positioning, technique, interpretation, capabilities, limitations)

- Doppler velocimetry
    - For upper & lower extremity (audible, analogue, waveforms & spectral analysis- capabilities, limitations)
    - Technique and qualitative interpretation
- Plethysmography (venous occlusion technique, volume pulse measurements - techniques, interpretation, capabilities, limitations)
    - Upper extremity
    - Lower extremity
    - Digits

Other Methods of Investigation (methods, interpretation, limitations)

- Computed Tomography (CT)
- Magnetic Resonance Imaging (MRI) & Magnetic Resonance Angiography (MRA)
- Angiography & Digital Subtraction Angiography (DSA)
- Radio Tracer Imaging (PET/SPECT)
- Intravasular Ultrasound
- Contrast enhanced Ultrasound

Therapeutic Intervention

- Medical therapy
    - Treatment of risk factors
    - Drug Therapy for Claudicants
    - Exercise Therapy for Claudicants
- Surgical therapy
    - Endarterectomy
    - Bypass grafts
    - Aneurysm repair including pseudoaneurysm – Open & EVAR
    - Combined hybrid revascularization
- Non-surgical intervention
    - Angioplasty - balloon and laser
    - Atherectomy
    - Stents (e.g. Drug eluting stents, Fenestrated)

- Thrombolysis

D. Cerebral Arterial Disease (28%)

Epidemiology of Cerebro-Vascular Disease

- Incidence & severity

Patient History and Physical Examination

- Symptoms
- Neurological
- Bruits
- Pulses
- Transient symptoms
- Stroke

Risk Factors and Contributing Diseases

- Age
- Sex
- Race
- Family History
- Smoking
- Diabetes
- Hypertension
- Hyperlipidaemia
- Renal disease
- Combination of risk factors and contributing diseases

Aetiology of Cerebro-Vascular Disease

- Stenosis
  - Atherosclerosis
  - Site
  - Ulceration
  - Haemodynamic significance
- Embolism
  - Atrial fibrillation
  - Mitral stenosis
  - Prosthetic heart valves and other causes
- Thrombosis
- Subclavian steal
- Dissection / fibromuscular dysplasia
  - Site
  - Mechanisms and causes
  - Age group
- Vasospasm
  - Link with subarachnoid haemorrhage

Duplex imaging (B-mode image, Doppler, colour, power, patient positioning, history, reporting, transducers, image orientation)

- Plaque
- Morphology and ulceration
  - Echogenicity
- Stenosis
  - Measurement (to include grading criteria)
  - Appearance

- Occlusion
    - Appearance
- Stents
- Post-operative imaging

Transcranial Doppler (patient positioning, technique, interpretation, capabilities, limitations, indications)

- Intraoperative monitoring
- Closure of patent foramen ovale (PFO)
- Sickle cell anaemia and STOP criteria

Other Non-invasive Vascular Tests (technique & interpretation)

- Indirect tests
    - Periorbital Doppler
    - Pressure ocular plethysmography
- Direct tests
    - Continuous wave Doppler (audible, analogue, waveforms, spectral waveforms)
    - Pulsed Doppler (audible, spectral waveforms)

Other Methods of Investigation (methods, interpretation, limitations)

- CT
- MRI & MRA
- Angiography & DSA

Therapeutic Intervention

- Medical therapy
- Surgical therapy
    - Endovascular therapy

E. Venous Disease (28%)

Epidemiology of Venous Disease

- Incidence

Aetiology of Venous Disease (Upper and Lower Limb)

- Valvular incompetence (superficial and deep)
- Thrombosis (superficial and deep)

Patient History / Signs and Symptoms (Upper and Lower Body)

- Acute deep vein thrombosis
- Pulmonary embolism
- Chronic venous insufficiency

Risk factors

Venous Insufficiency

- Age
- Lifestyle
- Genetics

Venous Thrombosis

- Cancer

- Clotting disorders
- Previous deep vein thrombosis
- Acute paraplegia
- Cardiac insufficiency
- Hormone Replacement Therapy

Venous Insufficiency and Thrombosis

- Pregnancy
- Body habitus
- Intravenous drug use
- Immobility
- Trauma

Physical Examination

- Varicose veins
- Skin changes
- Venous ulcers / mixed with arterial disease
- Lymphoedema
- Deep vein thrombosis (upper & lower limb)

Duplex Imaging (Upper & Lower Limb & Pelvic veins)

- Patient positioning, technique, interpretation, capabilities and limitations
- B-mode
- Pulse wave Doppler
- Colour
- Power
- Differential for DVT (Baker's cyst, branchial cyst, haematoma, popliteal aneurysm)

Nice Guidelines

- Varicose Veins in the leg : The diagnosis and management of varicose veins
- Diagnosing venous thromboembolism in primary , secondary and tertiary care
- Treating venous thromboemboliism

Pre-Operative Marking

- For vein to use in arterial bypass
- Prior to varicose vein surgery

Other Non-invasive Tests (technique & Interpretation)

- Hand held Doppler examination
  - Upper limb
  - Lower limb
- Plethysmography
  - Strain gauge
  - Impedance
  - Photo
  - Air

Other Methods of Investigation (methods, interpretations, limitations)

- Venography
- MRV
- D-dimer tests
- Wells Diagnostic algorithm
- Homan's sign

- CT Scanning
- Pulmonary embolism diagnosis
    - Nuclear medicine (V-Q scans)
    - CT Scanning

Therapeutic Intervention

- Medical therapy
- Surgical therapy
- Non-surgical intervention
- Endovenous treatments
    - Venous ulcer dressing
        - Compression Bandage Gradings
        - Best Practice for compression bandaging
    - Support stockings
    - Sclerotherapy, ablation techniques (RFA, EVLT), ultrasound-guided foam sclerotherapy
- Cosmetic treatments for thread veins
- Lifestyle changes
- Other treatments
    - Cycnoacylae glue occlusion
    - endovenous mechanochemical ablation
    - transilluminate powered phlebectory

F. Other Conditions (3%)

- Arteriovenous fistula
    - Traumatic
    - Congenital
    - Vascular access
- Trauma
- Compartment syndromes
- Carotid body tumours
- Carotid aneurysms
- Congenital vascular abnormalities
    - Klippel-Trenaunay syndrome
- Sickle cell anaemia
- Blood clotting disorders
- False aneurysms
- Cystic adventitial disease
- May Turner Syndrome
- Coeliac Artery Compression Syndrome