Module 1

Cardiothoracic and vascular – Questions

1. A 50 year old male presents with a history of occasional haemoptysis and exertional shortness of breath which has been getting progressively worse. Plain chest radiograph demonstrates bibasal reticular shadowing with volume loss. HRCT demonstrates bibasal fibrosis and traction bronchiectasis. Incidental note is made of a patulous oesophagus. Which of the following is the most likely cause?
   a. Tuberculosis
   b. SLE
   c. Rheumatoid arthritis
   d. Wegener's granulomatosis
   e. Scleroderma

2. A 35 year old woman presents with chest infection and pyrexia and the plain film reveals dense lobar consolidation with bulging fissures. The likely micro-organism is:
   a. *Legionella pneumophila*
   b. *Pneumocystis carinii*
   c. *Staphylococcus*
   d. *Streptococcus*
   e. *Klebsiella*

3. A 40 year old has a routine chest radiograph as a part of pre-immigration work up. This demonstrates a mass on the left with loss of the upper left heart border. The descending aorta can, however, be seen despite the mass. Which of the following is the most likely location of the mass?
   a. Apico-posterior segment
   b. Lingula
   c. Anterior segment of the upper lobe
   d. Posterior basal segment of the lower lobe
   e. Lateral basal segment of the lower lobe

4. In an investigation for lung malignancy, all of the following may produce a false positive result on a PET-CT except:
   a. Pulmonary hamartoma
   b. Intralobar sequestration
   c. Tuberculosis
   d. Pneumonia
   e. Scarring

5. A 70 year old man, previously working in a ship-building yard, presents with progressive breathlessness. Chest radiograph demonstrates bilateral calcified pleural plaque disease

with volume loss. Lung function shows a restrictive pattern. HRCT reveals pulmonary fibrosis. The most likely site of these changes would be:
a. Perihilar
b. Apical
c. Peribronchial
d. Subpleural
e. Fissural

6. A 35 year old man undergoes autologous bone marrow transplantation following successful treatment of lymphoma. Two weeks later he develops scattered bilateral progressive breathlessness and dry cough. HRCT demonstrates several areas of bilateral ground glass changes with associated reticular changes, but no effusions. What is the most likely explanation?
a. Angioinvasive aspergillosis
b. Lymphoid interstitial pneumonia
c. CMV pneumonia
d. Drug toxicity
e. Pulmonary oedema

7. A 67 year old man presents with abdominal discomfort three months after endovascular repair of an abdominal aortic aneurysm. The patient undergoes a non-contrast CT followed by an arterial phase study. There is high attenuation on the non-contrast study between the stent and the aortic wall, which enhances further in the arterial phase. The graft itself is intact, as are the attachment sites. Which of the following is the most likely cause for the appearance?
a. Type I endoleak
b. Type II endoleak
c. Type III endoleak
d. Graft infection
e. Dissection

8. A 16 year old with headache and hypertension has a chest radiograph which demonstrates plain radiographic signs of coarctation of the aorta. Further investigations reveal anomalous post-coarctation origin of the right subclavian artery. The ribs most likely to demonstrate inferior rib notching would be:
a. Left third to ninth ribs
b. Bilateral third to ninth ribs
c. Right third to ninth ribs
d. Bilateral first and second ribs
e. Left first and second ribs

9. A 38 year old man with progressive dyspnoea and chest pain undergoes an echocardiogram which reveals a pedunculated intracardiac mass which is hypointense to myocardium on T1-weighted images and markedly hyperintense on T2-weighted images. The most likely intracardiac location of the lesion would be:
a. Right atrium
b. Right ventricle
c. Left atrium
d. Under-surface of tricuspid valve
e. Anterior papillary muscle

10. A 56 year old female is found to have a small, well-defined anterior mediastinal mass on a chest radiograph which demonstrates homogeneous soft-tissue density with some peripheral calcification on CT. On MRI it is isointense to skeletal muscle on T1-weighted images and slightly increased signal on T2-weighted images. It is most likely to be:
    a. Thymic cyst
    b. Thymoma
    c. Thymolipoma
    d. Thymic hyperplasia
    e. Thymic carcinoma

11. A 51 year old man with long standing history of an erosive arthropathy of the acromio-clavicular joints and bilateral arthropathy in his hands subsequently develops progressive shortness of breath. The most likely abnormality on his chest radiograph would be:
    a. Cavitating nodules
    b. Peripheral basal reticulonodular shadowing
    c. Cardiomegaly
    d. Bronchiectasis
    e. Pleural effusion

12. A 22 year old is diagnosed with tuberculosis. Which of the following features will make a diagnosis of primary tuberculosis more likely?
    a. Mediastinal enlargement
    b. Septal thickening
    c. Upper zone cavitation
    d. Miliary nodules
    e. Apical consolidation

13. A 26 year old man suffers a blunt injury to his chest in a road traffic accident. The most common abnormality seen on CT as a result of blunt thoracic injury is:
    a. Pneumothorax
    b. Pulmonary laceration
    c. Haemothorax
    d. Tracheo-bronchial injuries
    e. Pulmonary contusion

14. A 26 year old undergoes a routine chest radiograph as part of the Australian residency application. The left upper lobe is hyperlucent and hyperexpanded and a lobular mass is demonstrated adjacent to the left hilum. CT reveals the presence of a dilated bronchus containing a plug of soft tissue. The surrounding lung is emphysematous. The most likely diagnosis is:
    a. Central carcinoid tumour
    b. Bronchogenic cyst
    c. Bronchial atresia
    d. Cystic adenomatoid malformation
    e. Congenital lobar emphysema

15. A 58 year old man with pancreatic cancer presents with recurrent pulmonary emboli despite adequate anticoagulation. He is shown on this admission to also have a right femoral DVT. He subsequently undergoes an IVC filter placement. Following a flush

injection in the IVC, injecting contrast at which of the following site is essential prior to stent placement?
a. Right hepatic vein
b. Left renal vein
c. Right common iliac vein
d. Right renal vein
e. Left common iliac vein

16. A 40 year old man presents with worsening breathlessness, fever and chills following a visit to an aviary earlier in the day. HRCT is most likely to demonstrate:
a. Mid-zone interstitial lines
b. Areas of air-space shadowing
c. Pleural effusions
d. Lymphadenopathy
e. Crazy paving

17. The staging chest CT of a 40 year old man with a known primary malignancy demonstrates cavitating pulmonary metastases. The least likely type of primary lesion would be:
a. Squamous cell carcinoma
b. Malignant melanoma
c. Renal cell cancer
d. Sarcomas
e. Colonic carcinoma

18. A 25 year old woman with a longstanding history of non-erosive arthritis of the hands and a malar rash presents with progressive breathlessness and respiratory dysfunction. Blood serology demonstrates anti-DNA antibodies. Which of the following is the most common feature on the chest radiograph?
a. Pleural effusion
b. Consolidation
c. Cavitating nodules
d. Pulmonary oedema
e. Pulmonary fibrosis

19. A 40 year old man with a known malignancy presents with pericardial metastases and pericardial effusion. The metastatic deposits are high signal on T1-weighted imaging. Which is the likely primary diagnosis?
a. Lymphoma
b. Lung cancer
c. Melanoma
d. Fibrosarcoma
e. Colorectal cancer

20. The diagnostic role of CT in patients with pulmonary emboli is well established, but a prognostic role is being proposed as well. Which of the following has the most widely accepted prognostic value?
a. PA clot burden score
b. Leftward bowing of the intraventricular septum
c. Reflux of contrast into the IVC
d. RV/LV diameter ratio
e. PA diameter measurement

21. A 55 year old man has a repeat chest radiograph which demonstrates a persistent patch of consolidation four months after a previous radiograph. Bronchioloalveolar carcinoma (BAC) is suspected. Which of the following makes the diagnosis less likely?
    a. Low attenuation consolidation
    b. Negative PET-CT
    c. Central location
    d. Long history of smoking
    e. Associated cavitation

22. A 62 year old man presents with right shoulder pain which radiates down his arm. A plain radiograph confirms the presence of a right apical mass with destruction of the surrounding ribs. CT-guided biopsy is performed and is likely to reveal:
    a. Large cell lung cancer
    b. Squamous cell cancer
    c. Small cell lung cancer
    d. Adenocarcinoma
    e. Carcinoid

23. A 25 year old man has a routine chest radiograph prior to a work permit application. It demonstrates a well-defined, rounded mediastinal mass. Which of the following features on CT would make a diagnosis of bronchogenic cyst less likely?
    a. Soft-tissue density
    b. Thick wall
    c. Precarinal location
    d. Communication with tracheal lumen
    e. Unilocularity

24. A 45 year old man presents with a history of cough and occasional haemoptysis. Plain chest radiograph demonstrates a right paracardiac shadow with loss of the right heart border. Bronchoscopy demonstrates an endoluminal obstructive mass. The most likely site of the lesion would be:
    a. Right upper lobe anterior segmental bronchus
    b. Right lower lobe lateral basal segmental bronchus
    c. Bronchus intermedius
    d. Right upper lobe posterior segmental bronchus
    e. Right middle lobe bronchus

25. A 54 year old man presents with breathlessness and palpitations. Clinical examination reveals a mid-diastolic murmur with presystolic accentuation. Echocardiography confirms the presence of a mobile intracardiac mass in the left atrium attached to the septum by means of a stalk. Which of the following is the most likely feature of the lesion on MRI?
    a. Hypointense relative to myocardium on T1-weighted images
    b. Uniform hyperintense to myocardium on T2-weighted images
    c. Uniform enhancement following gadolinium
    d. Hyperintense to blood pool and hypointense to myocardium on steady-state free precession (SSFP) images
    e. Prolapse of the mass through the mitral valve, best demonstrated on the short axis views

26. A 34 year old IV drug abuser presents with fever, rigors and back pain. Blood cultures reveal staphylococcal septicaemia. CT demonstrates a mycotic aneurysm. Which of the following is the most likely CT feature?
    a. Fusiform shape
    b. Perianeurysmal soft-tissue mass
    c. Pseudoaneurysm
    d. Periaortic gas collection
    e. Mural thrombus

27. An area of abnormality is noted within the juxtahepatic IVC of a patient with cirrhosis undergoing an MR scan. The area is hyperintense on T1-weighted imaging, and appears as a filling defect on three-dimensional fat-suppressed volume-interpolated breathhold sequence. Appearances vary in shape and location on different images. The abnormality is likely to represent:
    a. Flowing blood
    b. Thrombus
    c. Tumour thrombus
    d. Artefact due to aortic pulsation
    e. Pseudolipoma

28. A 60 year old female underwent a right pneumonectomy for bronchogenic carcinoma. Which feature on plain chest radiograph would be a cause of worry seven days after surgery?
    a. A sequential increase in the fluid level
    b. Shift of the previously central trachea to the right
    c. Shift of the previously central trachea to the left
    d. Elevation of the right hemi-diaphragm
    e. Shift of the cardiac silhouette to the right

29. A 22 year old asthmatic presents with recurrent wheeze and productive cough with expectoration of brown sputum. Plain chest radiograph demonstrates multiple pulmonary infiltrates. Which of the following appearances on HRCT would be the most appropriate for acute allergic bronchopulmonary aspergillosis?
    a. Finger-in-glove opacity
    b. Thick-walled cavity
    c. Pleural thickening with or without an effusion
    d. Endobronchial mass with distal atelectasis
    e. Tree-in-bud appearance

30. A 36 year old female with history of pelvic pain and severe dysmenorrhoea undergoes a pelvic ultrasound examination which reveals uterine fibroid disease. Which of the following imaging features would be associated with the best outcome following uterine artery embolisation?
    a. Submucosal location
    b. Subserosal location
    c. Associated adenomyosis
    d. Calcification
    e. Multiple fibroids

31. A young man presents with progressive productive cough and halitosis. He had severe pneumonia as a child. Plain chest radiograph demonstrates bronchial dilatation and

bronchial wall thickening with some volume loss. Which of the following HRCT findings is the most sensitive finding for bronchiectasis?
a. Air trapping
b. Mucous-filled dilated bronchi
c. Bronchial wall thickening
d. Bronchi seen in the subpleural region
e. Lack of bronchial tapering

32. A 35 year old female presents with generalised malaise and cough, occasionally bringing up grape-skin-like material. Blood screen reveals eosinophilia. The patient has a history of travel to several countries worldwide. Which of the following plain film features is unlikely?
a. Homogenous ovoid opacity
b. Cyst with a fluid level
c. Bilateral opacities
d. Calcification
e. Lower zone location

33. A 33 year old male patient suffering from AIDS presents with constitutional symptoms and dry cough. His CD4 count is 150. HRCT is least likely to show:
a. Pleural effusion
b. Ground glass changes
c. Bilateral interstitial infiltrates
d. Diffuse alveolar infiltrates
e. Pneumatocoeles

34. A 26 year old female patient with an optic nerve tumour and café-au-lait spots presents with exertional breathlessness. Imaging of the chest is most likely to reveal which of the following?
a. Multiple small lower lobe cysts
b. Emphysema
c. Lower zone fibrosis
d. Thick-walled cavities in the upper zone
e. Asymmetrical upper zone fibrosis

35. A 52 year old with cardiomyopathy is referred for delayed contrast-enhanced cardiovascular MR (DE-CMR). The following are all false except:
a. An inversion recovery pulse of an appropriate TI is applied to nullify the signal from the ischaemic myocardium
b. A long TI would nullify the signal from both the normal and diseased tissue
c. A TI of 200 ms would nullify the signal intensity from the normal myocardium
d. Imaging should be commenced immediately after contrast injection
e. The images are T1-weighted ECG-gated fast spin-echo sequences with an inversion recovery sequence

36. In the same patient (with cardiomyopathy), which underlying cause and corresponding enhancement pattern are inappropriate?
a. Ischaemic cardiomyopathy – subendocardial pattern in a coronary artery territory
b. Early myocarditis – patchy, focal subendocardial pattern

c. Hypertrophic cardiomyopathy – patchy multifocal changes, commonly the right ventricular free wall and its junction with the interventricular septum
d. Amyloidosis – global and diffuse, commonly subendocardial
e. Dilated cardiomyopathy – midwall myocardial enhancement

37. A 30 year old man has a routine chest radiograph which reveals a small soft-tissue shadow resulting in loss of part of the mid-descending aortic outline. Which of the following is the most likely cause?
a. Thymoma in the left lobe of thymus
b. Hilar lymphadenopathy
c. Lingular collapse
d. Intercostal schwannoma
e. Teratoma

38. A 68 year old miner develops an irregular opacity in the upper zone on plain chest radiograph. Which imaging feature would be more in favour of malignancy than progressive massive fibrosis (PMF)?
a. Peripheral enhancement on contrast-enhanced MR
b. Peripheral location on axial images
c. Presence of calcification
d. High signal on T2-weighted images
e. Avid lesion on PET-CT

39. A 36 year old asthmatic attends an outpatient respiratory clinic complaining of recent increasing dyspnoea. Bloods show an elevated white cell count and eosinophilia. Chest radiograph reveals multiple areas of ill-defined peripherally based consolidation. Subsequent chest radiographs over the coming week show the consolidation to resolve in places but commence in other previously unaffected areas. The most likely cause is:
a. Alveolar sarcoidosis
b. Bronchioalveolar carcinoma
c. Acute eosinophilic pneumonia
d. Chronic eosinophilic pneumonia
e. Loffler syndrome

40. The plain chest radiograph of a 52 year old male presenting with cough and haemoptysis reveals a veil-like opacity over the left upper zone. CT reveals an endobronchial lesion in the left upper lobe bronchus causing lobar collapse. Bronchoscopic biopsy is least likely to reveal:
a. Squamous cell carcinoma
b. Carcinoid
c. Lymphoma
d. Metastatic renal cell cancer
e. Bronchioloalveolar carcinoma

41. A 60 year old man who recently suffered a haemorrhagic stroke develops pulmonary emboli. He is referred for an IVC filter insertion and angiography is performed prior to this. The usual reasons for doing so would be all of the following except:
a. To identify the renal veins
b. To identify the hepatic veins

c. To size the IVC
d. To rule out the presence of a left IVC
e. To evaluate for the presence of an IVC thrombus

42. A 22 year old female patient with a known phakomatosis presents with anaemia and hypotension. CT angiogram reveals evidence of active bleeding in some of the multiple areas of low attenuation (approximately –20) seen scattered throughout both her kidneys. Which of the following features may be seen on chest CT?
a. Multiple pulmonary AVMs
b. Multiple bilateral small cysts
c. Mediastinal mass
d. Thin-walled upper zone bullae
e. Cardiac rhabdomyomas

43. A 33 year old female patient presents with a longstanding history of fever, dry cough and weight loss. The chest radiograph reveals mediastinal lymphadenopathy. Blood investigations reveal hypercalcemia and elevated angiotensin-converting enzyme (ACE). Which of the following appearances of lymphadenopathy on CT would be the least likely feature in favour of the clinical diagnosis?
a. Bilateral hilar lymphadenopathy
b. Egg-shell calcification
c. Predominant involvement of the right paratracheal lymph nodes
d. Lymphadenopathy without any parenchymal involvement
e. Posterior mediastinal lymph nodes

44. The HRCT of a 35 year old patient with shortness of breath and reticulonodular disease pattern on plain chest radiograph reveals cavitating nodules with interstitial septal thickening. Which of the following diagnoses is the least likely?
a. Lymphangioleiomyomatosis
b. Langerhans' cell histiocytosis
c. Wegener's granulomatosis
d. Sarcoidosis
e. Rheumatoid lung

45. Eight days after lung transplantation for alpha-1 antitrypsin deficiency, a 45 year old man develops pyrexia, breathlessness and desaturation. HRCT reveals perihilar heterogenous opacities and ground glass changes with new pleural effusion and septal thickening. Which of the following is the most likely cause?
a. Reperfusion oedema
b. Acute rejection
c. Anastomotic dehiscence
d. Post-transplantation PCP infection
e. Hyperacute rejection

46. A 45 year old female patient with history of rheumatic fever as a child presents with progressive shortness of breath and paroxysmal nocturnal dyspnoea. Clinical examination reveals a pansystolic murmur associated with a mid-diastolic murmur with presystolic accentuation best heard over the cardiac apex. Clinical examination and

plain film do not reveal evidence of heart failure, but several features of left atrial enlargement are noted. Which of the following is not one of those?
a. Double atrial shadow on the right
b. Straightening of the right heart border
c. Elevation of the left main bronchus
d. Splaying of the carina
e. Displacement of the descending aorta to the left

47. A 70 year old man undergoes surgery for AAA. Two weeks following surgery, he is readmitted to the A&E department with abdominal pain and fever. Palpation of the abdomen suggests a pulsatile mass. A CT angiogram is performed, which does not demonstrate contrast extravasation. Which of the features on CT angiogram would be most worrisome?
a. Presence of a pseudoaneurysm
b. Periaortic soft tissue
c. Thickening of a fluid-filled third part of the duodenum
d. Some ectopic gas in the vicinity
e. Loss of fat plane between the grafted aorta and the adjacent duodenum

48. A seven year old boy with no known medical history presents with hypertension and postprandial abdominal pain. CT reveals an abnormality in the abdominal vasculature. Subsequent angiogram demonstrates occlusion of the coeliac axis and superior mesenteric artery and tapering of the mid-aorta. Delayed imaging shows vessel reconstitution through collaterals. The most likely diagnosis is?
a. Takayasu arteritis
b. Midaortic syndrome
c. Neurofibromatosis
d. Marfan's syndrome
e. Syphilitic aortitis

49. A patient with a known collagen vascular disease has pulmonary fibrosis. HRCT reveals bilateral lower lobe bronchiectasis. Which collagen vascular disease is most likely?
a. Sjogren syndrome
b. Progressive systemic sclerosis
c. SLE
d. Rheumatoid arthritis
e. Dermatomyositis

50. A 30 year old female patient with a history of recurrent lower respiratory tract infections as a child presents with cough and dyspnoea. Chest radiograph demonstrates a smaller hyperlucent left lung. Which of the following features is unlikely to be seen on HRCT?
a. Air trapping
b. Small left hemithorax
c. Diminished size of pulmonary vessels
d. Bronchiectasis
e. Left hilar enlargement

51. A 60 year old man presents with a 6 month history of shortness of breath, wheeze and a recent episode of haemoptysis. Plain chest radiograph reveals partial right middle and