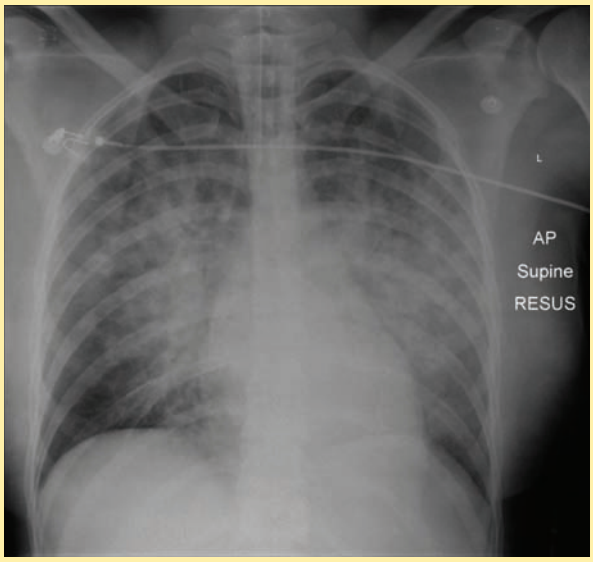
Radiology corner

Case 1

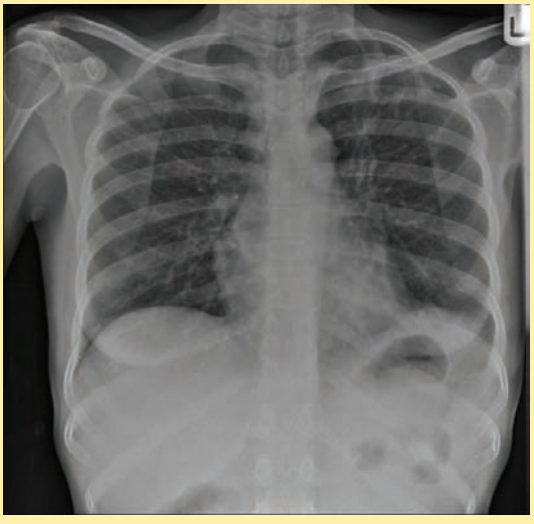
A 35-year-old female is admitted following a fall and head injury secondary to excess alcohol intake. Computed tomography imaging revealed a subdural haematoma, subarachnoid haemorrhage and non-depressed skull fracture. A radiograph was taken.



1. What is the main abnormality?
    a) Airspace abnormality
    b) Interstitial abnormality
    c) Pleural abnormality
    d) Mediastinal abnormality
    e) Bony abnormality
2. Given the clinical history, what is the most likely diagnosis?
    a) Cardiogenic pulmonary oedema
    b) Neurogenic pulmonary oedema
    c) Fluid overload
    d) Acute respiratory distress syndrome
    e) Drug toxicity
3. Is the endotracheal tube appropriately positioned?
    a) Yes
    b) No

Case 2

A 58-year-old female is admitted with cough and shortness of breath. A radiograph was taken.



1. Where is the main abnormality located?
    a) Right upper lobe
    b) Left upper lobe
    c) Left base
    d) Right base
2. Is the abnormality:
    a) Solid
    b) Cavitating
3. Provide a differential diagnosis.

Answers

Case 1

1. a) Airspace abnormality. The main finding is bilateral airspace shadowing within both lungs predominantly in a so-called "bat's wing" or "butterfly" distribution. The cardiac size is within normal limits on the anterior–posterior radiograph.

2. b) Neurogenic pulmonary oedema [1].

3. a) Yes. The endotracheal tube is appropriately positioned. It can move position with the patient's neck movements. It should be positioned approximately midway between the carina and the vocal cords; this is approximately at the level of the medial ends of the clavicles with the neck in a neutral position. Normally, the endotracheal tube tip should be projecting between the level of the aortic notch and 2 cm cranial of the carina.

   A number of intracranial conditions, including head trauma, seizures, intracranial haemorrhage, craniotomy and tumours can be associated with acute pulmonary oedema. It is radiographically indistinguishable from cardiogenic pulmonary oedema but note the heart size is not enlarged.

   The mechanism of the oedema is unclear but is suspected to be due to over-activity of the autonomic nervous system resulting in increased pulmonary blood volume with raised pulmonary venous pressure. Endothelial damage may also play a part.

Case 2

1. b) Left upper lobe

2. b) Cavitating.

3. The main diagnosis to consider in a patient of this age would be primary bronchogenic malignancy, and the primary lung cancer which is most likely to cavitate is squamous cell cancer. The main differential diagnosis to exclude, because it is treatable, is TB, which can present with a cavitating mass particularly at the lung apex. Other infections which commonly cavitate are *Staphylococcus aureus* and *Klebsiella pneumonia* infections.

   Septic/aseptic embolism post infarction can also cavitate. Cavitating pathologies that are usually multiple but which can be single include metastasis, and granulomatous conditions such as granulomatosis with polyangitis, sarcoidosis and rheumatoid nodules. Rarer causes of an apparently cavitating lung mass include cystic bronchiectasis, bronchogenic cyst and a sequestrated segment [2].

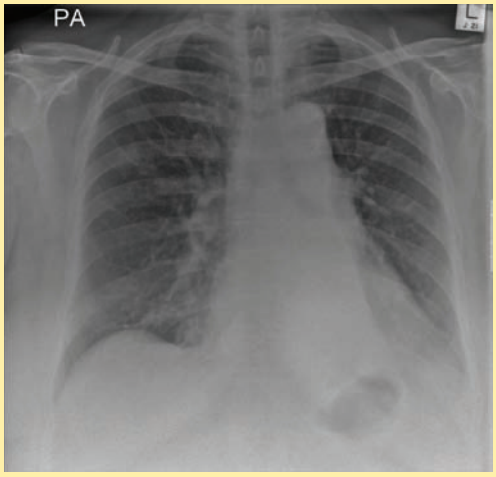
References

1. Hansell D, Armstrong P, Lynch D, *et al*. Imaging Diseases of the Chest, Third Edition. Maryland Heights, Mosby, 2000.
2. Chapman S, Nakielny R. Aids to Radiological Differential Diagnosis. Philadelphia, Elsevier Saunders, 2003.

Case 3

A 62-year-old male presents with shortness of breath. A radiograph was taken (figure 3)

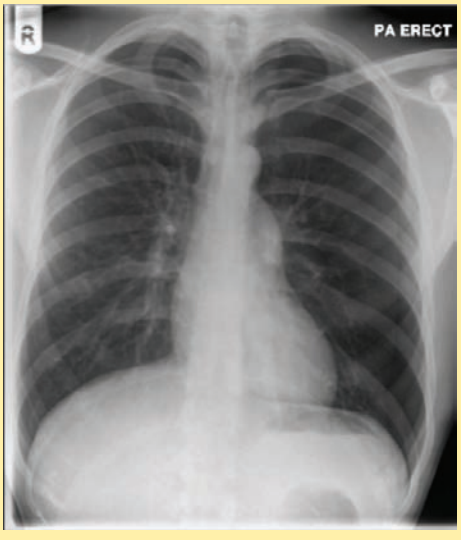
1. What is the main abnormality?
    a) Consolidation
    b) Pneumothorax
    c) Mediastinal mass
    d) Lobar collapse
    e) Reticulonodular shadowing
2. What is the most likely diagnosis
    a) Mucous pluggin
    b) Foreign body obstruction
    c) Carcinoid tumour
    d) Bronchogenic malignancy



Case 4

A 23-year-old male presented with increased shortness of breath and chest pain which had developed suddenly. His past medical history included left-sided inguinal hernia repair and previous retinal detachment in the right eye. Examination of his respiratory system was recorded as unremarkable but his cardiovascular examination revealed a soft mid-systolic murmur.

1. What is the main abnormality?
    a) Pneumomediastinum
    b) Pectus excavatum
    c) Pleural effusion
    d) Rib notching
    e) Pneumothorax
2. What is the most likely unifying diagnosis?
    a) Ehlers–Danlos syndrome
    b) Marfan's syndrome
    c) Osteogenesis imperfecta
    d) Alkaptonuria
    e) Pseudoxanthoma elasticum



Answers

Case 3

1. d) Lobar collapse. There is evidence of left lower lobe collapse. Radiographic findings that are in keeping with left lower lobe collapse [3]. Triangular density projected behind the heart (the so called "sail sign") which is due to collapse of the left lower lobe with the oblique fissure coming into profile as it moves medially and posteriorly. Loss of the medial aspect of the left hemi-diaphragm. The left basal pulmonary artery cannot be visualised and the left hilum is in a lower position than normally expected. Another finding you may encounter (not present on this film) is associated crowding of the ribs on the affected side due to volume loss of the left hemi-thorax.

2. d) Bronchogenic malignancy. When collapse is present it indicates an obstructive cause. All the options provided are possible causes but the most common in a middle aged or elderly adult, particularly if they smoke is bronchogenic malignancy which should be the diagnosis of exclusion. The hyperinflated lungs in this case would suggest a smoking history. Carcinoid tumours are benign and usually central. They more commonly present in a younger age group but are frequently intraluminal and can result in lobar collapse. Lobar collapse due to a mucus plug is particularly seen in asthmatics. Lobar collapse due to foreign body obstruction is most common in childhood.

Case 4

1. e) Pneumothorax. Left-sided pneumothorax. Pneumothorax can occur spontaneously in healthy individuals when it is described as “primary” pneumothorax. It can also occur as a result of trauma or as a “secondary” pneumothorax in patients with underlying lung disease. Aspiration of this pneumothorax was attempted but was unsuccessful and the patient required insertion of an intercostal drain.

2. b) Marfan’s syndrome. The unifying diagnosis in this patient was Marfan’s syndrome which is an autosomal dominant condition caused by a mutation in the fibrillin-1 gene on chromosome 15. The clues in the history are those of the systolic heart murmur which was due to mitral valve prolapse, retinal detachment and inguinal hernia which can all occur in patients with Marfan’s syndrome.

Manifestations of Marfan’s syndrome

Respiratory	Increased risk of spontaneous pneumothorax
Skeletal	Arachnodactyly
	Increased arm span
	Kyphoscoliosis
	Pectus excavatum/carinatum
	High arched palate
	Hyperextensible joints
Eyes	Upward lens dislocation
	Retinal detachment
Cardiac	Mitral valve prolapse
	Aortic root dilatation; potential aortic regurgitation and increased risk of aortic dissection.
CNS	Dural ectasia

References

3. DeLacey G, Morley S, Berman L. The Chest X-ray: A Survival Guide. Philadelphia, Elsevier Saunders, 2008.