Answer

**Answer to question 1:** Given the uniformity (all look the same), size (pinhead size), and diffuse distribution (central and peripheral, no postural movement), this must be diagnosed as a miliary pattern.

**Answer to question 2:** No. In the presence of an aortic configuration there are no signs of interstitial edema. The changes show no postural movement. No effusion.

**Answer to question 3:** Chronic bronchitis or senile emphysema is certainly present (barrel chest and thickened hila indicative of preexisting pulmonary arterial hypertension). However, the individual densities are too uniform, too large, and too diffusely distributed for micronodules in bronchitis.

**Answer to question 4:** The shadow in broad contact with the pleura on the left side exhibits a pattern of thin calcification. It represents a chronic pleural induration consistent with tuberculous pleuritis.

**Evaluation:** Suspcion of miliary tuberculosis from reactivated pulmonary tuberculosis. The CT chest scan performed the same day ([Fig. 3.87](#)) confirms this suspicion.

**Epicrisis:** The patient died 7 days later despite immediate initiation of tuberculostatic therapy. The autopsy revealed massive miliary tuberculosis with reactivation in the vicinity of a calcified induration on the left side with local caseous pneumonia.

![Fig. 3.86 Lateral view of the patient in Fig. 3.85.](image1)

![Fig. 3.87 CT findings on the day of admission. Pronounced random pattern of nodular shadowing. The morphology is consistent with sarcoidosis, but this is improbable given the patient’s age. A report of previous findings mentioned no abnormalities, which eliminates pneumoconiosis. The tentative diagnosis is miliary tuberculosis (senile tuberculosis).](image2)
Review Case 6

The patient is an 84-year-old woman with known absolute arrhythmia presenting in the outpatient department with palpitations (Fig. 3.88). No fever or dyspnea. Nonsmoker.

**Question 1**

Insofar as this is possible in only one plane, describe the heart configuration. Which heart chamber is definitely enlarged? (Previously discussed in Chapter 1.)

**Question 2**

How do you evaluate chest shape? Is COPD present? (Previously discussed in Chapter 2.)

**Question 3**

How do you evaluate the changes in the upper lung fields and hila? Is any other pathology present that might be related to the next chapter (Chapter 4)?

**Hints**

Note the left cardiac border.

Note the patient’s age.

The patient is a nonsmoker.

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*Fig. 3.88* Patient presenting for diagnostic evaluation of cardiac arrhythmia.
Central Bronchial Carcinoma

Radiographic findings in central bronchial carcinoma may be classified as direct or indirect signs caused by the tumor.

Indirect signs:
- Reduced perfusion
- Paradoxical hilum sign
- Hypertransradiancy
- Hypoventilation
- Displaced septa
- Mediastinal shift
- Dystelectasis or atelectasis
- Poststenotic pneumonia

Direct signs:
- Contour deformity due to hilar thickening, perihilar streaky densities, and central mass
- Bronchial or tracheal narrowing

For example, a central bronchial carcinoma with endobronchial growth will only be suggested by indirect signs on the plain chest radiograph. However, CT can directly visualize the lesion as a mass within the bronchus.

Indirect Signs (Fig. 4.4)

Bronchial narrowing from a carcinoma close to the hilum but undetectable on the plain chest radiograph can also be demonstrated indirectly by a reflexive reduction in perfusion. The ipsilateral hilum is reduced in size, whereas the contralateral hilum is thickened. Oeser described this as the “paradoxical hilum” sign (Fig. 4.5).

Hypertransradiancy of the affected area can be exacerbated by local hyperinflation due to a valve mechanism. This valve mechanism is similar to that observed in children presenting with chronic aspiration of a foreign body such as a peanut. Air is able to pass through the bronchial stenosis on inspiration but cannot escape on expiration (see Table 4.1 for differential diagnosis of local hypertransradiancy).

Table 4.1 Causes of local hypertransradiancy

- Pulmonary embolism?
- Pneumothorax?
- Local emphysema?
- Valve mechanism?
- Pneumatocele?
- Dystrophy?
- Soft-tissue defect?

Fig. 4.4a–d Schematic diagram of indirect signs.

a Reduced perfusion and paradoxical hilum sign.
b Hypertransradiancy.
c Atelectasis.
d Local hypoventilation.
Fig. 4.5 a, b Oeser paradoxical hilum sign in a bronchial carcinoma in the right lung.

a Obstructive barrel chest with signs of chronic bronchitis. Heart size is normal with no signs of decompensation. The left hilum appears normal, whereas the right one is narrowed. The right upper lobe is hyperinflated and pulmonary emphysema is suspected. Status post serial rib fractures on the left side.

b Follow-up examination one year later. The right upper lobe still appears hyperinflated. There is now a mass 3 cm in diameter at the right upper lobar bronchus with streaky spicules radiating into the surrounding tissue (black arrows).
Silicosis

**Diagnosis**

“The diagnosis of silicosis is made on the basis of the radiograph in the presence of an appropriate occupational history.”

(German Federation of Commercial Professional Associations)

Earlier the diagnosis of silicosis was strongly influenced by an appropriate occupational history or the health insurance fund, or at least the radiologist’s attention was drawn to early changes consistent with the disease. Today the situation is more complex, as the classic occupational history of mining has been superseded by industrial metal processing. We may assume that a large number of cases of inhalational damage due to silicosis are misinterpreted as emphysematous bronchitis caused by cigarette smoking.

Do not forget to investigate the patient’s occupational history.

The basic examination in suspected silicosis involves conventional chest radiographs obtained with hard radiation. Radiographic signs of silicosis include:

- Occurrence of small, sharply demarcated round opacities (p, q, r according to the ILO classification) showing a predilection for the upper lung fields and perihilar region.
- Lesions become confluent, forming massive fibrosis with perifocal radiolucencies.
- Liquefaction can produce black sputum (melanoptysis).

The small nodules in simple silicosis (sandblasters and stonemasons) are typically relatively sharply demarcated, creating a picture resembling grain kernels or pellets (Fig. 5.42). In anthracosilicosis (miners) the nodules are less sharply defined. Here the predilection for the upper lung fields creates a picture resembling snow flurries (Fig. 5.43). The radiolucencies around the massive fibrosis (Fig. 5.44a) are the result of two processes: “migration” of the nodules toward the conglomerate mass, “cleaning” the vicinity; and emphysema associated with scarring (Fig. 5.44b).

The term “snow flurry lung” (Fig. 5.43) may require some explanation for those accustomed to warmer climates: In a snowstorm, you can make out individual snowflakes if you look down or straight ahead. But if you look up, you will only see the white cloudy sky (the foci become confluent).

**Notes on Clinical Findings**

Many process materials used in industrial production, especially quartz, contain crystalline silicates. The extraction and processing of these materials can produce dust that can cause silicosis. Hazards exist in mining, construction, the ceramics industry, the metal industry, and foundries.

Silicosis exhibits three essential courses:

- Acute silicosis from massive exposure (as in tunnel construction), leading to invalidity within months
- Accelerated course over a period of a few years
- Chronic course after a variable duration of exposure from 15 to 30 years

All these forms are characterized by the clinical triad of dyspnea, cough, and expectorate. Physical examination findings include noisy breathing and abnormal sounds on percussion. A restrictive ventilation defect is present in the advanced stage.
Fig. 5.44 a, b Radiolucency around the massive fibrosis. The patient is a 70-year-old miner with advanced anthracosilicosis (a). There is a distinct radiolucency around the large opacity (category A); otherwise the small opacities are diffusely distributed (distribution category 3). The CT scan (b) shows a focal lesion in the right lower lung field with significant perifocal emphysema.

Fig. 5.43 “Snow flurries” in anthracosilicosis. The patient is a 65-year-old miner with advanced pneumoconiosis. The small opacities show an apicobasal decrease in intensity. Massive apical fibrosis is seen.

Fig. 5.42 Pelletlike silicosis in a 59-year-old male scissors sharpener. The detail enlargement of the left lower lung field shows primarily q opacities with very high radiodensity (distribution 2/2) and severe emphysema.