

Department of Radiology – Case of the Month #7

Part 1 – Identifying Abnormalities

21-year-old male patient with fever of unknown origin and hemoptysis. A chest x-ray is ordered (Figures 1 and 2):

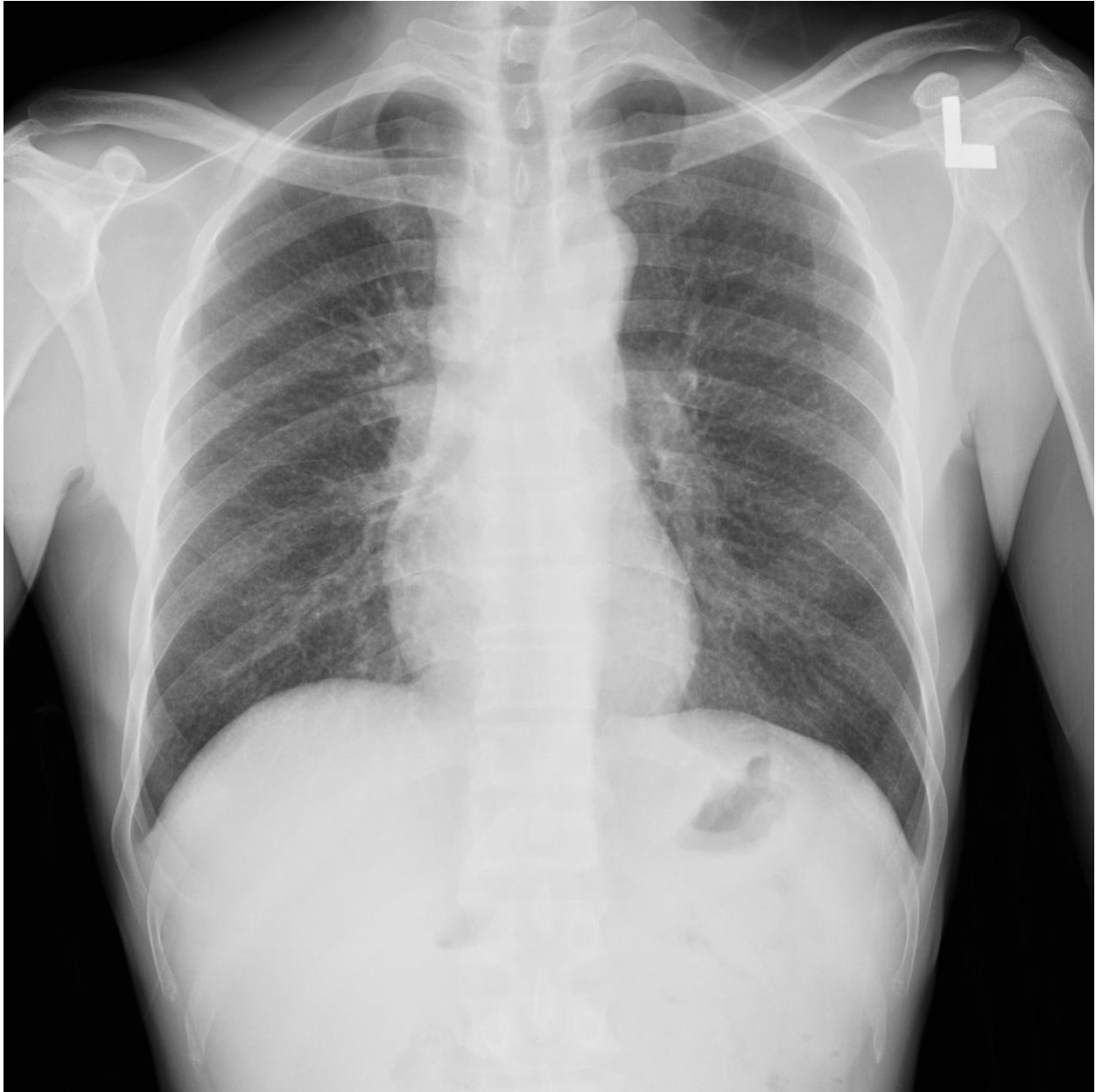


Figure 1: PA View



Figure 2: Lateral View

Prompting Questions:

- 1) Can you identify any abnormalities in the above scans?
- 2) How would you characterize the abnormality/abnormalities?
-too white or too black? Shape? Borders?
- 3) Can you localize the abnormality?

Part 2 – Characterization

Examination of the PA film reveals a widened mediastinum of increased opacity:

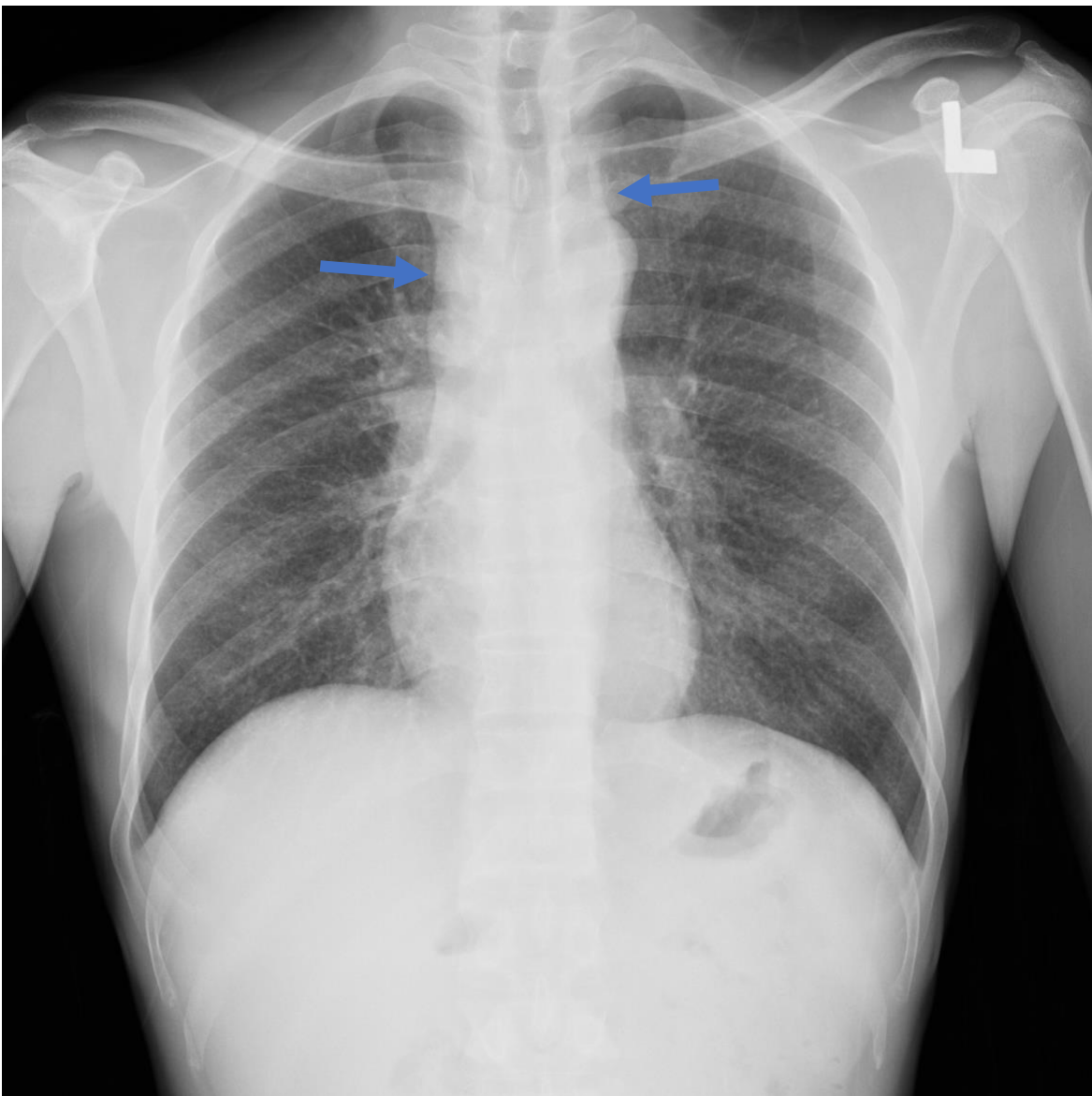


Figure 3: Upper mediastinum which is wider and whiter than normal.

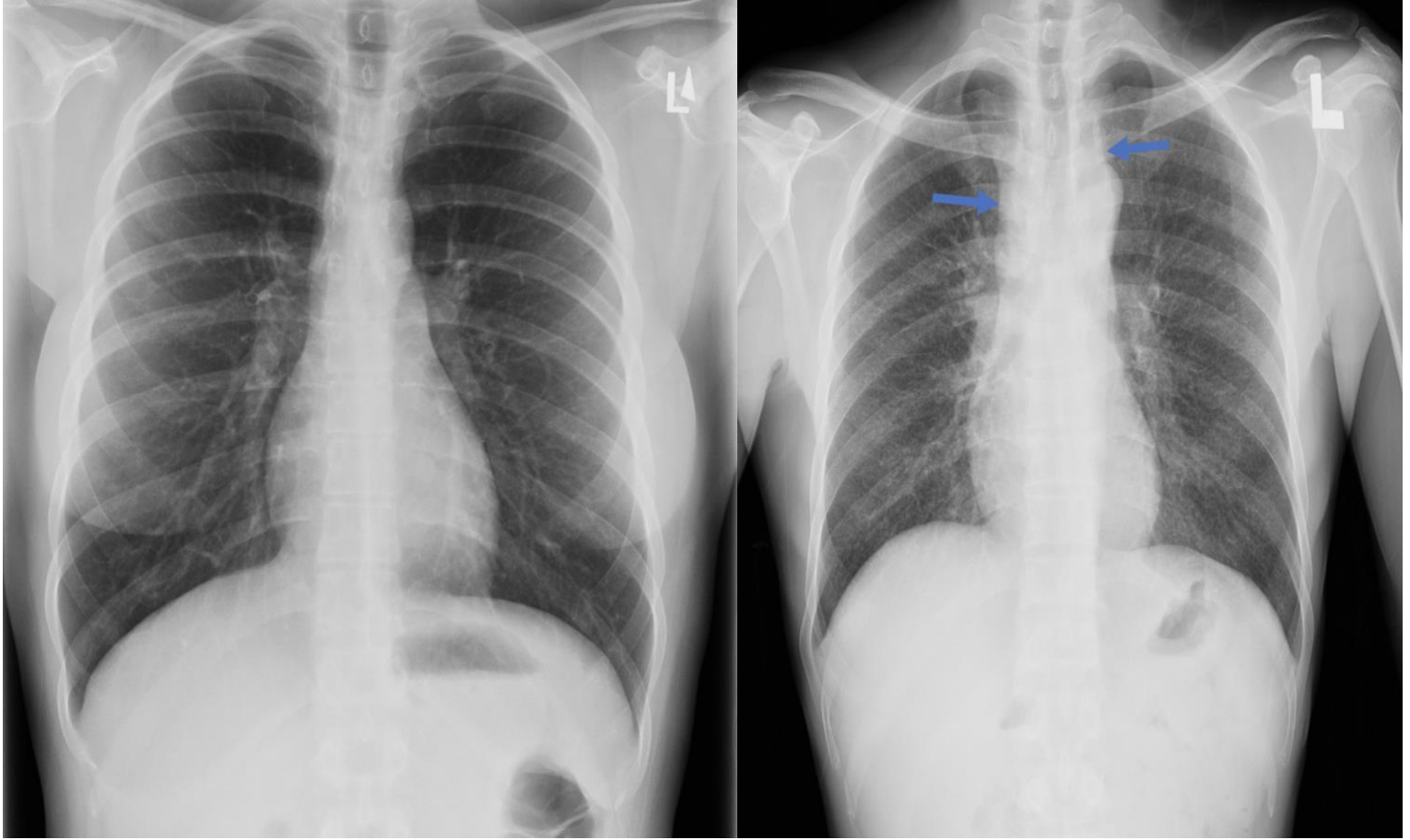


Figure 4: side-by-side comparison – normal PA film on left; widened, opaque mediastinum on right.

Commentary:

If we compare this patient's PA chest X-ray to a normal X-ray (Figure 4), we can identify several abnormalities. First, the upper mediastinum looks widened and is whiter than normal. The right edge of the mediastinal border should form a straight line. In this case the right border is bulging outward (Figure 5):

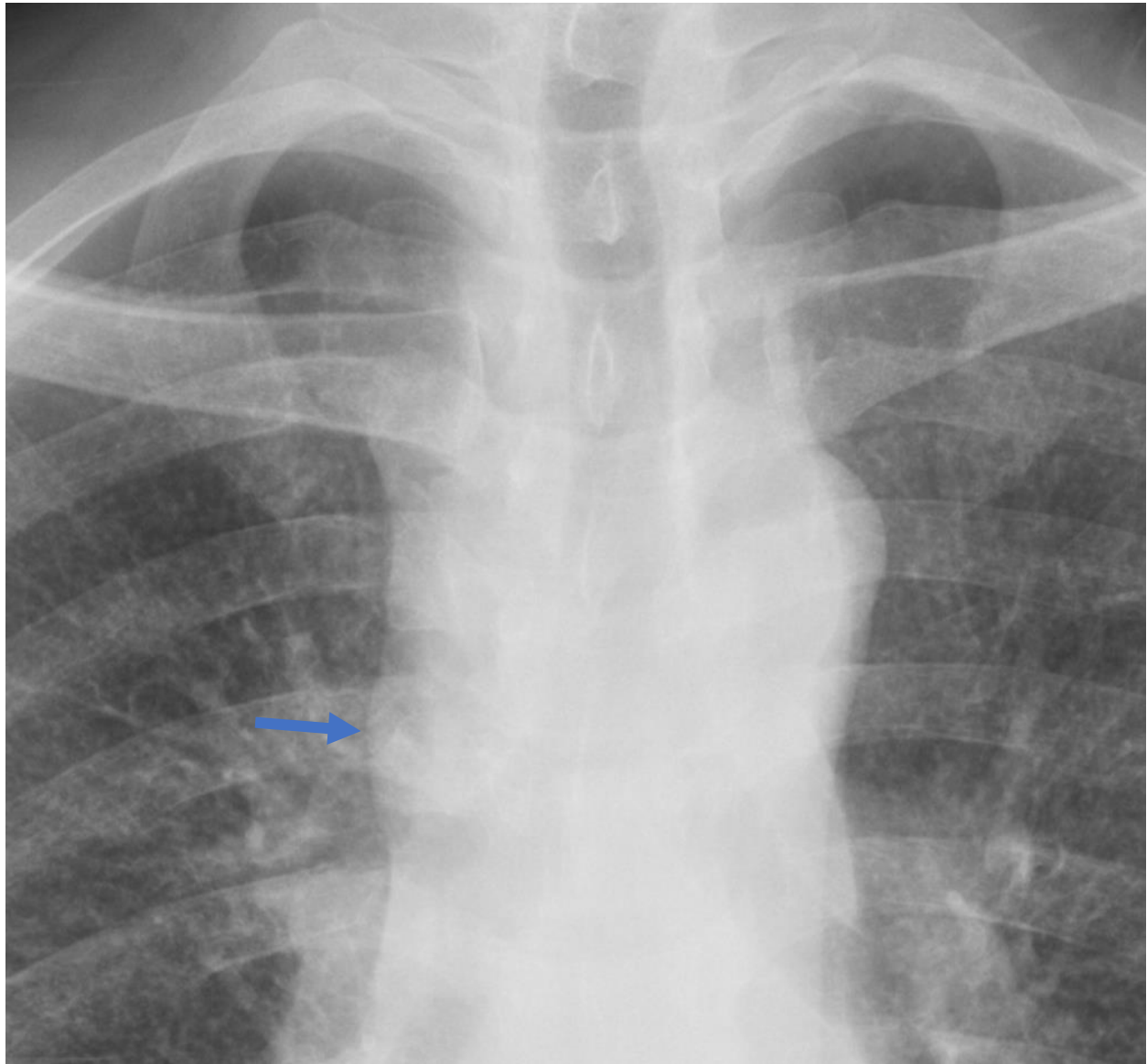


Figure 5: Chest X-ray magnification. The right border of the mediastinum (blue arrow) should be vertical and straight. In this case, the border is bulging outward.

If you identified this abnormality, then well done! To complete our interpretation, we need to be sure to go over all of the other structures in the scan to ensure we haven't missed anything. We should use a systematic approach to accomplish this.

Systematic Approach to the Other Structures:

- 1) Are the trachea and airways normal?
- 2) Are the lung fields normal?
- 3) Are the hila normal?
- 4) Is the heart normal?
- 5) Is the chest wall normal?
- 6) Is the pleura normal?

Review both the PA and lateral films from above and try to answer these 6 questions with a yes or no.

Part 3 – Review of Other Structures

Upon reviewing the PA and lateral films, all structures appear normal EXCEPT the lung fields:

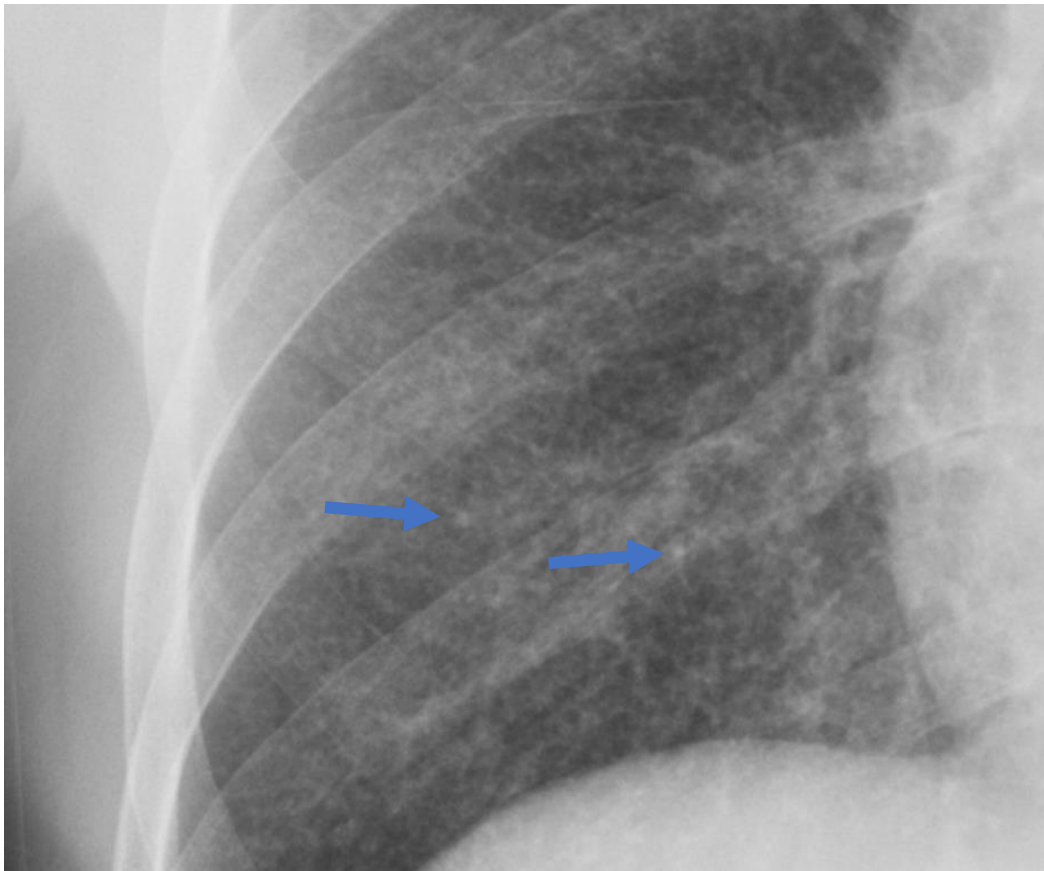


Figure 6: Chest X-ray, PA, magnification. Numerous, small < 3 mm nodules can be seen throughout both lung fields.

Commentary:

If we compare the appearance of the lungs with the normal X-ray in Figure 4, we can identify that the lungs are also abnormal. Within the lungs there are numerous, small, < 3 mm nodules. These are non-calcified and appear to be distributed evenly throughout the lungs. The nodules are visible both on the PA film as well as on the lateral:

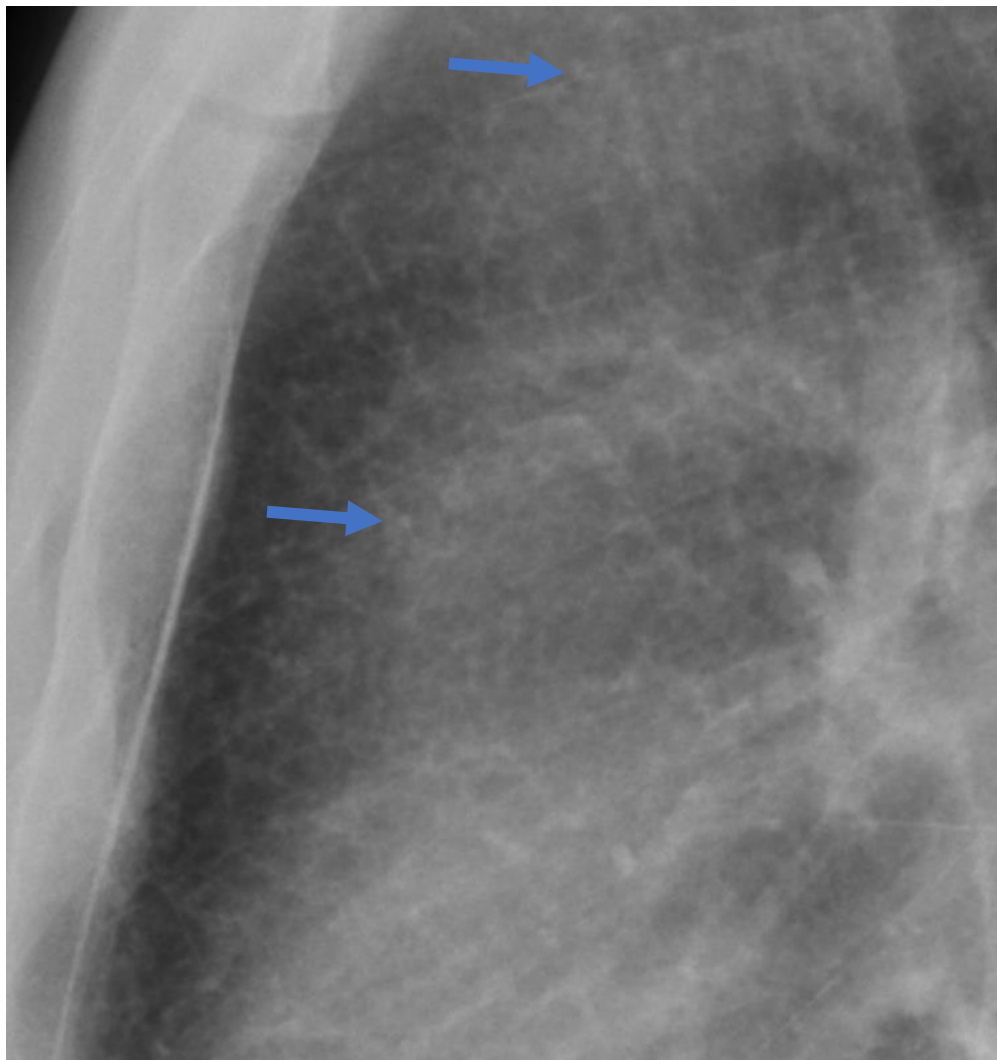


Figure 7: Chest X-ray, lateral, magnification. Numerous, small < 3 mm nodules can be seen, particularly in the retrosternal air space.

A subsequent Computed Tomography examination confirmed the presence of the nodules and their distribution (Figure 8) as well as mediastinal adenopathy which was the cause of the widened mediastinum:

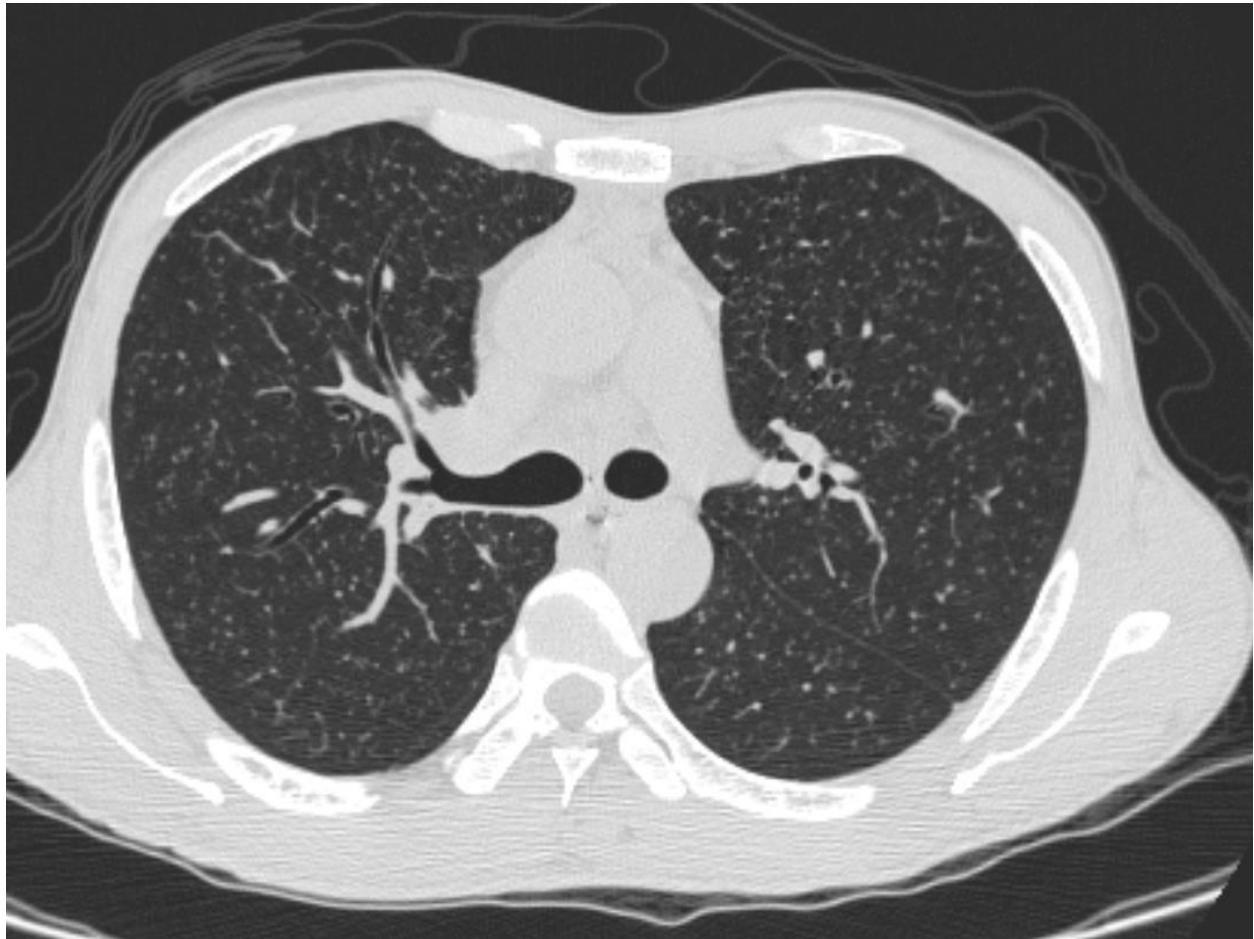


Figure 8: CT scan, Axial image. Numerous, small, non-calcified, < 3 mm nodules are seen throughout both lungs.

Prompting Questions:

- 1) Based on the findings, what is on your differential?
- 2) How does the clinical history of fever and hemoptysis help narrow your differential?
- 3) Do we require further diagnostics to establish a diagnosis?

Summary:

The chest X-ray shows numerous, small, non-calcified, < 3 mm nodules throughout both lungs. In addition, there is widening of the mediastinum.

Small lung nodules can be caused by infectious disease processes, such as tuberculosis, or by non-infectious processes, such as metastases or silicosis. For this reason, it is appropriate to have a differential diagnosis based on whether the patient is febrile or afebrile.

If febrile, the differential diagnosis would include tuberculosis and histoplasmosis. If afebrile, the differential diagnosis would also start with infectious causes, such as tuberculosis and histoplasmosis. However, we would then also include the following:

- Neoplastic causes – such as metastases from the thyroid gland.
- Occupational exposure – such as silicosis.
- Unknown etiology – such as sarcoidosis.

Diagnosis:

Miliary Tuberculosis. This patient was a recent immigrant from Asia. The combination of the miliary pattern and adenopathy, strongly points to tuberculosis infection.