Department of Radiology – Case of the Month #5

Part 1 – Identifying Abnormalities

21-year old male patient with chronic back pain and a cough. The patient is on hemodialysis for renal failure. A chest x-ray is ordered (Figures 1 and 2):
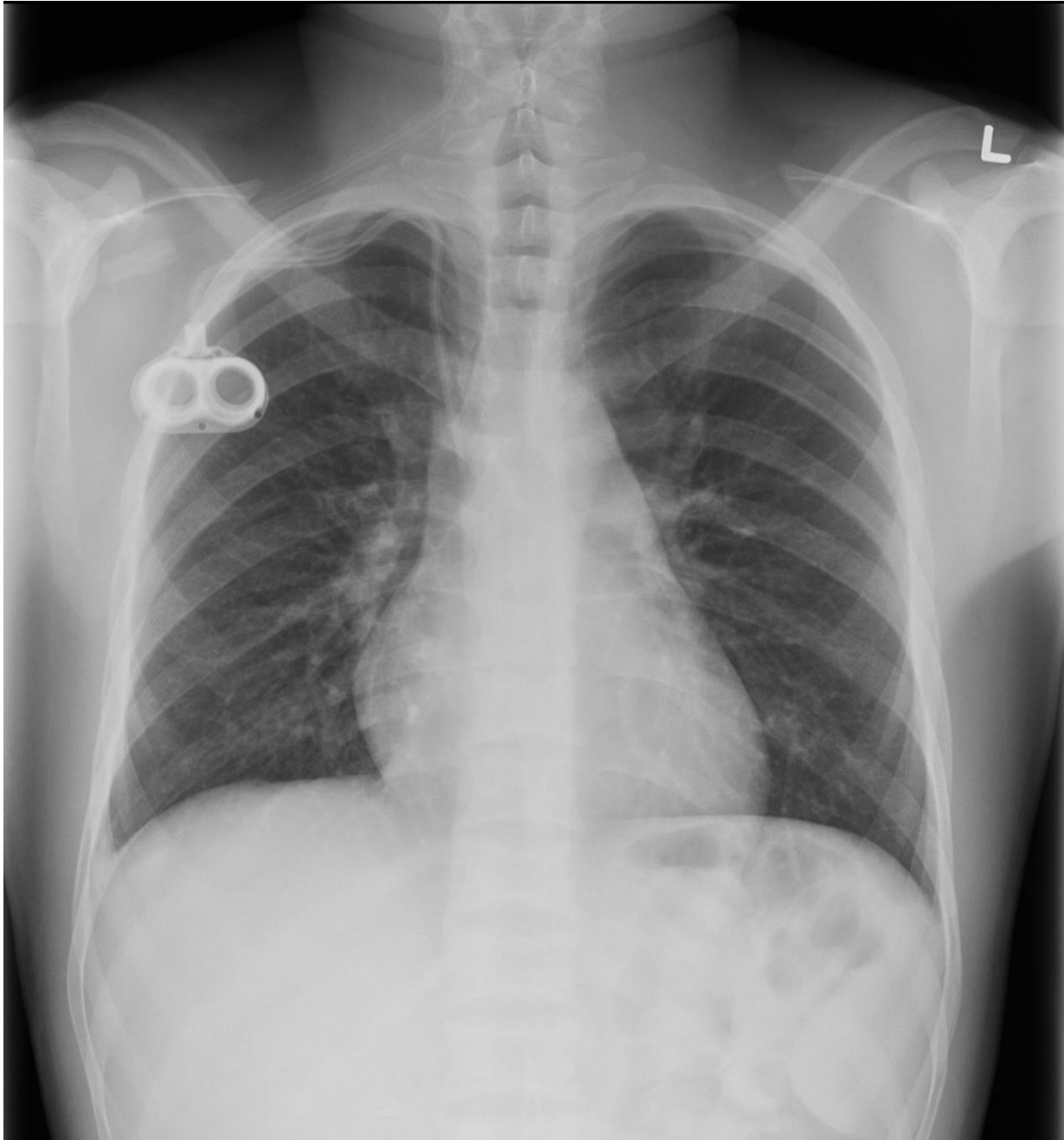

Figure 1: PA View

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 – Lines, Tubes, and Other Medical Devices
Examination of the PA film reveals the presence of a central line:
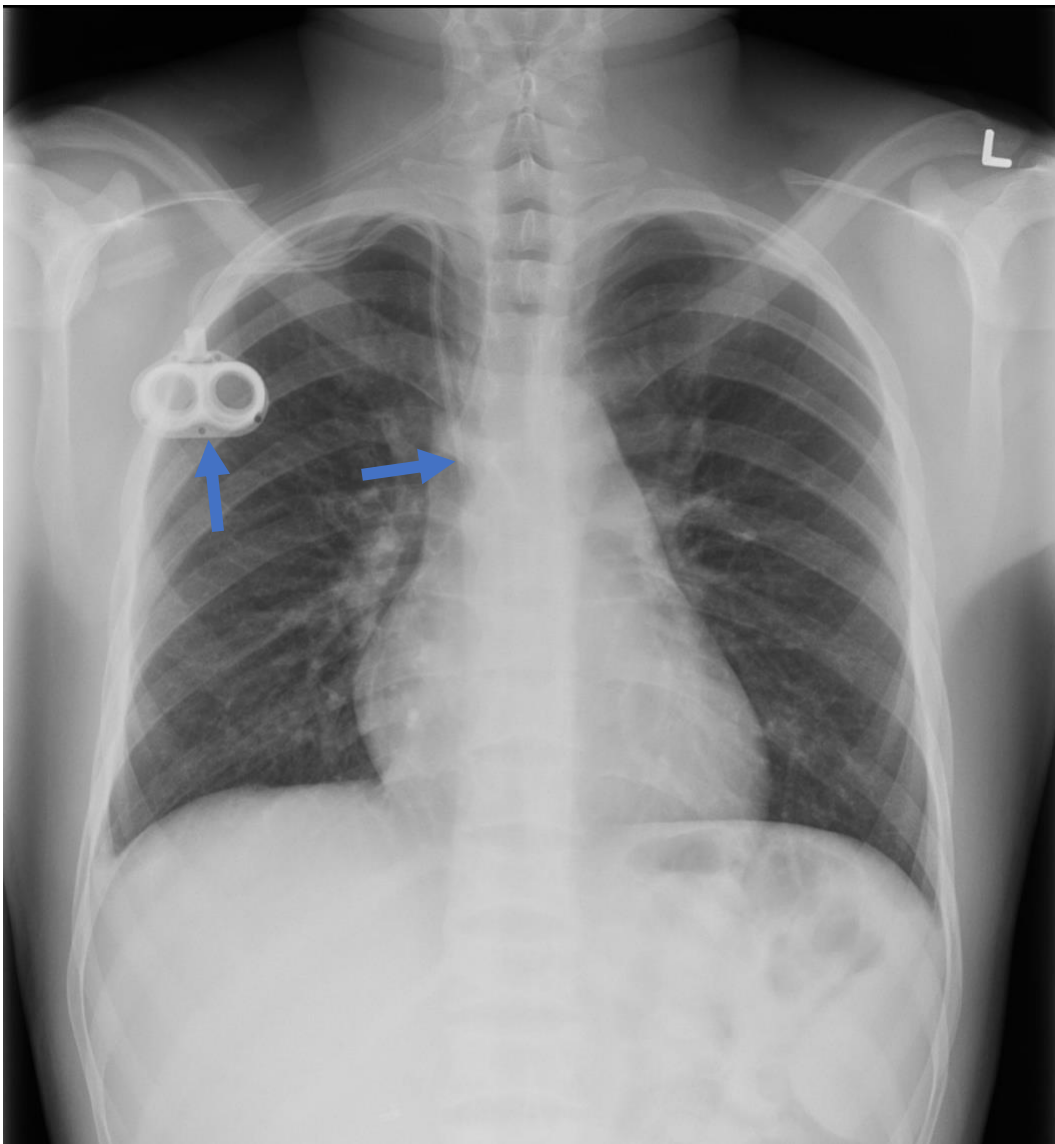

Figure 3: The PA view shows a double lumen catheter with tip placed in the SVC.

The obvious finding on the PA view is the presence of a double lumen central catheter. The above image shows the tip is in an appropriate position. When this type of line is observed on imaging it is important to check for the presence of a pneumothorax.

Prompting Questions:
1) Does this patient have a pneumothorax?
2) Does a systematic review of the PA scan reveal any other abnormalities? What about the lateral scan?
3) How do you determine whether or not the tip of the central line is in "an appropriate position?"

Part 3 – Abnormalities on the Lateral

A review of the PA film reveals no further findings. There is no pneumothorax present in this patient. The lateral film reveals the following:

Figure 4: Lateral Chest X-ray. Vertebral body endplate changes (arrows) are seen at multiple levels.

Compare the above abnormal vertebral bodies to the following normal lateral film:
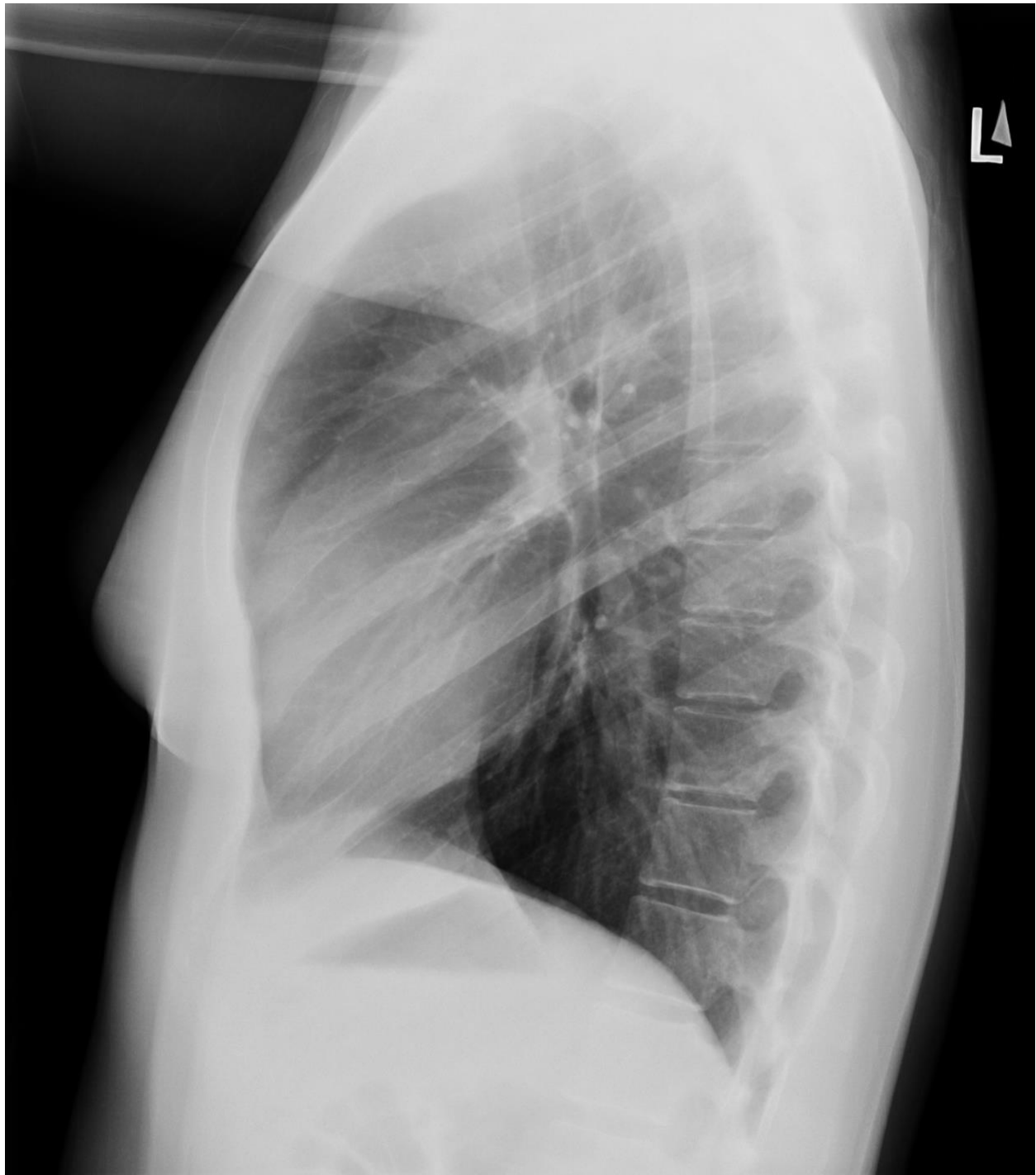
Figure 5: Lateral Chest X-ray with normal vertebral bodies for comparison.

Prompting Questions:

1) How would you describe the endplate changes? Practice your use of radiographic vocabulary by writing a one-line description of your findings.

2) What is on your differential diagnosis at this point?

       -how does the clinical history inform our differential?

       -how does the shape / character / location of the abnormality

       help us refine our differential?

3) What are the next steps? Do we require further imaging?

Part 4 – Cone View and Summary

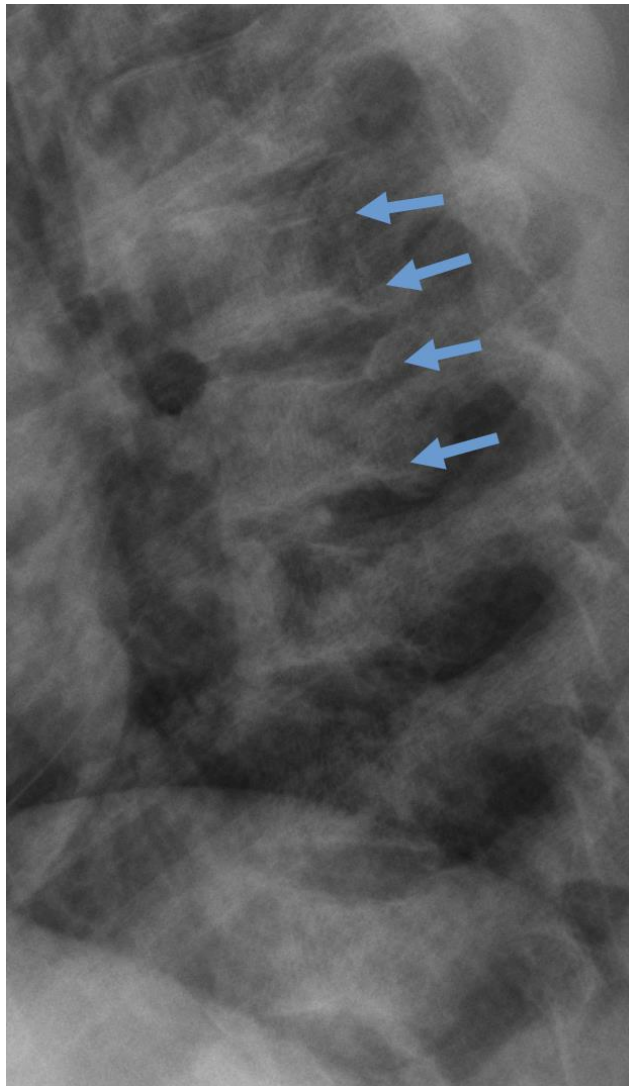To further characterize the abnormality, a cone view X-ray is performed:

Figure 6: Lateral thoracic spine X-ray (coned view) highlights the changes involving the vertebral body end plates (arrows).

Commentary:

Multilevel biconcave deformity of the vertebral bodies, sometimes referred to as "fish vertebrae" or "codfish vertebrae" sign, is the result of softening of the bone. This softening occurs due to ischemia of the middle part of the vertebral growth plate and it presents on lateral radiographs as an exaggeration of the normal concavity of the superior and inferior surfaces of one or more vertebral bodies. This finding is commonly seen in sickle cell disease. Other causes of the "fish-vertebrae" are hereditary spherocytosis, homocystinuria, osteogenesis imperfecta, renal osteodystrophy, and osteoporosis.

Diagnosis:

Multilevel endplate deformities secondary to sickle cell disease.

Final Questions:
1) What further investigations would we order to confirm the diagnosis?
2) What treatment would be appropriate?
3) This patient is on hemodialysis. What is the pathophysiologic connection between sickle cell disease and renal failure?