

# CT Thoracic Spine

CT of the thoracic spine is a fairly straightforward exam, following many of the same principles as the CT cervical spine exam. The essential elements include assessing the bony alignment, vertebral body and disc heights, as well as the integrity of the posterior elements. As always, it's important to look at the soft tissues and make sure you don't miss something in the retroperitoneum or an incidental finding in the lungs. The approach is similar whether or not the study is contrast enhanced, though you'll obviously be able to delineate some pathology more clearly with contrast.

## **1. Check the history/indications/priors.**

- a. See if there are prior MR exams through the same area, or contrast enhanced exams through the chest, abdomen, or pelvis. These can help problem-solve any findings you make.

## **2. Check the adequacy, technique, and limitations.**

- a. Common limitations include streak artifact and motion near the diaphragm. Keep these in mind, especially when looking for fractures/subtle findings in the affected anatomy.
- b. If the images are coned down to see structures close to the spine, it's important to know whether you'd be responsible for findings in the remaining anatomy.

## **3. Check the localizer images.**

- a. You may see additional findings in the lungs, body, etc. in anatomy that is not in the field of view for the cross-sectional images.
- b. You may also see the extremities, which the patient may not be able position away from the scanned anatomy. You may be the first to pick up fractures or other abnormalities this way.
- c. Always look at the localizer views!

## **4. Take a quick look at the 3D reconstructed images.**

- a. These may be helpful in evaluation of the ribs and clavicles.
- b. Compression fractures may be particularly conspicuous.

## **5. Do a quick first look at the spinal canal.**

- a. Do not miss a collection or mass lesion.

## **6. Assess any hardware.**

- a. Look for hardware fracture.

- b. Look for migration – change in position of components relative to each other as well as relative to the patient anatomy.
- c. Look for adjacent lucency.
- d. Look for associated mass lesions/collections.

## **7. Note overall bone morphology and quality.**

- a. Is there relative osteopenia or sclerosis?
- b. Are there 12 rib-pairs?
  - i. Are any of the ribs malformed or fused?
  - ii. Are any hypoplastic?
- c. Are there cervical ribs? Other segmentation anomalies?
- d. Are the vertebrae normal in shape?
- e. Are there any diseases of bony fusion such as DISH/OPLL/AS?

## **8. Assess alignment.**

- a. On the sagittal images, look at the anterior, posterior, spinolaminar lines. Also trace the ends of the spinous processes.
  - i. Check that the spinous processes are equally spaced.
  - ii. On parasagittal images, look for alignment of the facet joints.
- b. On the coronal images, look at the right and left spinal lines.
- c. Note any disruption in the “lines” as in fracture/lithesis. Look for abnormal curvature (scoliosis, kyphosis/lordosis) or straightening.

## **9. Assess the osseous vertebra and discs.**

- a. This is best done on the sagittal images, correlated with the coronals. You may benefit from creating oblique reconstructions if there is significant spinal curvature or kyphosis.
- b. Check the check vertebral heights one by one.
  - i. Look at the trabecular pattern/density of each vertebra.
  - ii. Look for osseous lesions, trabecular overlap/thickening.
- c. Check disc heights one by one.
  - i. Look at both coronal and sagittals when assessing vertebral body and disc height. Not all height loss in is in the anterior-to-posterior direction.
  - ii. Don’t forget to check any visualized cervical or lumbar verterbrae. Pathology may be seen in these incidentally.
- d. Scroll to the parasagittal facet joints and look for fracture or “jumped” facets.
- e. Check the remaining posterior elements: pedicles, lamina, and spinous processes for fractures/lesions.

- f. Check for disruption of any confluent ossified ligaments or syndesmophytes if there are regions of abnormal bony fusion. A break in otherwise fused syndesmophytes is suspicious for fracture.
- g. Look for lucent and sclerotic bone lesions. Using soft tissue windows can help detect subtle lesions. Make sure the window setting helps compensate for any bone demineralization, which can make it difficult to spot small lesions.
- h. Note any osteophytes or endplate changes that would indicate degenerative etiologies.

#### **10. Assess the bones on axial images.**

- a. The axials are particularly useful to assess the posterior elements/arches.
- b. They can be helpful also for problem solving at findings on the coronal and sagittal images.
- c. Look at any visualized cervical/lumbar vertebra – body, arch, transverse processes, spinous processes.

#### **11. Look for spinal canal and foraminal narrowing.**

- a. With narrow windowing look at the spinal canal. Look for any large mass/collection.
- b. Check that the spinal canal is normal in caliber throughout the whole spine.
- c. Do a quick check of the neuroforamina at each.

#### **12. Assess all other visualized osseous structures.**

- a. Look at the scapulae.
- b. Look at the clavicles and any part of the visualized upper extremities.
- c. Look at each rib.
- d. Remember that you're looking for both fractures as well as lucent/sclerotic bone lesions.

#### **13. Look at the non-osseous structures.**

- a. You may see a portion of the neck, including the thyroid gland and upper aerodigestive track. Be careful not to miss a mass lesion here.
- b. Check the lungs for nodules, ground glass opacities, and consolidation.
- c. Check for pleural fluid, air, and nodules.
- d. Look at the mediastinum.
- e. Look at the retroperitoneum.
  - i. Assess the caliber of the aorta.
  - ii. Look for adenopathy.
  - iii. Look for any masses in the peritoneum/retroperitoneum and in the solid organs.

**14. Look at the paraspinal soft tissues.**

- a. Check the paraspinal musculature for mass lesions, atrophy, or asymmetry.
- b. Check the subcutaneous fat and skin. Look for mass lesions or edema.

**15. Perform last checks.**

- a. Take a step back and look to see if you've explained the clinical picture.
- b. Ask yourself again if the alignments and heights are okay.
- c. Make sure you looked for suspicious bone lesions, not just fractures.
- d. Make sure you've look at the corners of the study including the non-osseous structures. Be especially careful not to miss an incidental lung cancer or other malignancy in the visceral structures.