CT Lumbar Spine

CT of the lumbar spine follows a similar pattern as the cervical and thoracic spine. Many of the concepts are reiterated here. Concepts specific to the lumbar spine are elaborated further below and mostly pertain to the incidentally imaged boney and visceral pelvis. 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 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 maybe 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 the overall bone morphology and quality.**
    a. Is there relative osteopenia or sclerosis?
    b. Are there 5 lumbar vertebral bodies?
        i. Is there transitional lumbosacral anatomy?
        ii. Are there any related pseudarthroses?
        iii. Are there other segmentation anomalies or malformations?
        iv. Are the posterior elements normal in morphology or is there evidence of a dysraphism?
        v. Are the vertebrae otherwise normal in shape?
    c. Are there any diseases of bony fusion such as DISH/OPLL/AS?
    d. It is important to be very specific about numbering spine levels, especially when there is transitional anatomy. The "gold standard" is counting down from C1-C2 if comparisons or a total spine view is available.
        i. Correlation with nerve anatomy can also be done if there is

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/listhesis. 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.
    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 thoracic vertebra. Pathology may be seen in these incidentally.
    d. Scroll to the parasagittal facet joints and look for fractures/lesions.
    e. Also, on parasagittal images look for pars defects. Look specifically at the L4-L5 and L5-S2 levels.

f. Look specifically at each transverse process – these can be easy to skip over.
g. Check the remaining posterior elements: pedicles, lamina, and spinous processes for fractures/lesions.
h. Check for disruption of any confluently ossified ligaments or syndesmophytes if there are regions of abnormal boney fusion. A break in otherwise fused syndesmophytes is suspicious for fracture.
i. Look for lucent and sclerotic bone lesions.
    i. 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.

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.

11. **Look for spinal canal and foraminal narrowing.**
    a. With narrow windowing look at the spinal canal. Look for any large mass/collection. Look for prominent epidural fat or thickening of the ligamentum flavum.
    b. Check that the spinal canal is normal in caliber throughout the visualized spine.
    c. Check the neuroforamina at each level. Check for disc bulges and facet arthropathy. Look along the central, paracentral, subarticular, foraminal, and far lateral distributions.
    d. Note that disc pathology in the far lateral distribution is a common blind spot, and may similarly correlate with patient symptoms.

12. **Assess all other visualized osseous structures.**
    a. Look at any visualized lower ribs.
    b. Look at the sacroiliac joints.
    c. Look at the boney pelvis.
    d. Remember that you're looking for both fractures as well as lucent/sclerotic bone lesions

13. **Look at the non-osseous structures.**
    a. Check the visualized lung bases for nodules, ground glass opacities, consolidation.
    b. Check for pleural effusions/nodules.

c. Look at the abdominopelvic contents.
    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.
    iv. Assess the iliopsoas musculature for collections/mass lesions.
    v. Make sure you assess each portion of the visualized pelvis viscera.

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 and proofread.**
    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 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 mass, adenopathy, or a big aortic aneurysm.