Thoracolumbar Spine MRI

Scan Coverage and Planning

The thoracolumbar spine (TL Spine) is the more complex area of the CNS to scan clinically, as the coverage is much broader since both the full thoracic spine and lumbar spine are included. There are various protocol for scanning the TL spine that can vary quite a bit from clinician to clinician, so it is best to establish clinician preference ahead of time. The most important image to acquire accurately is the sagittal, since this is where pathology is initially identified, and the image from which axial sequences are planned. Poor quality sagittal images will hinder identifying pathology, which can greatly extend scan and anesthesia time. There are two primary paths for TL spine scanning in regards to sagittal imaging: Whole Spine or Separate.

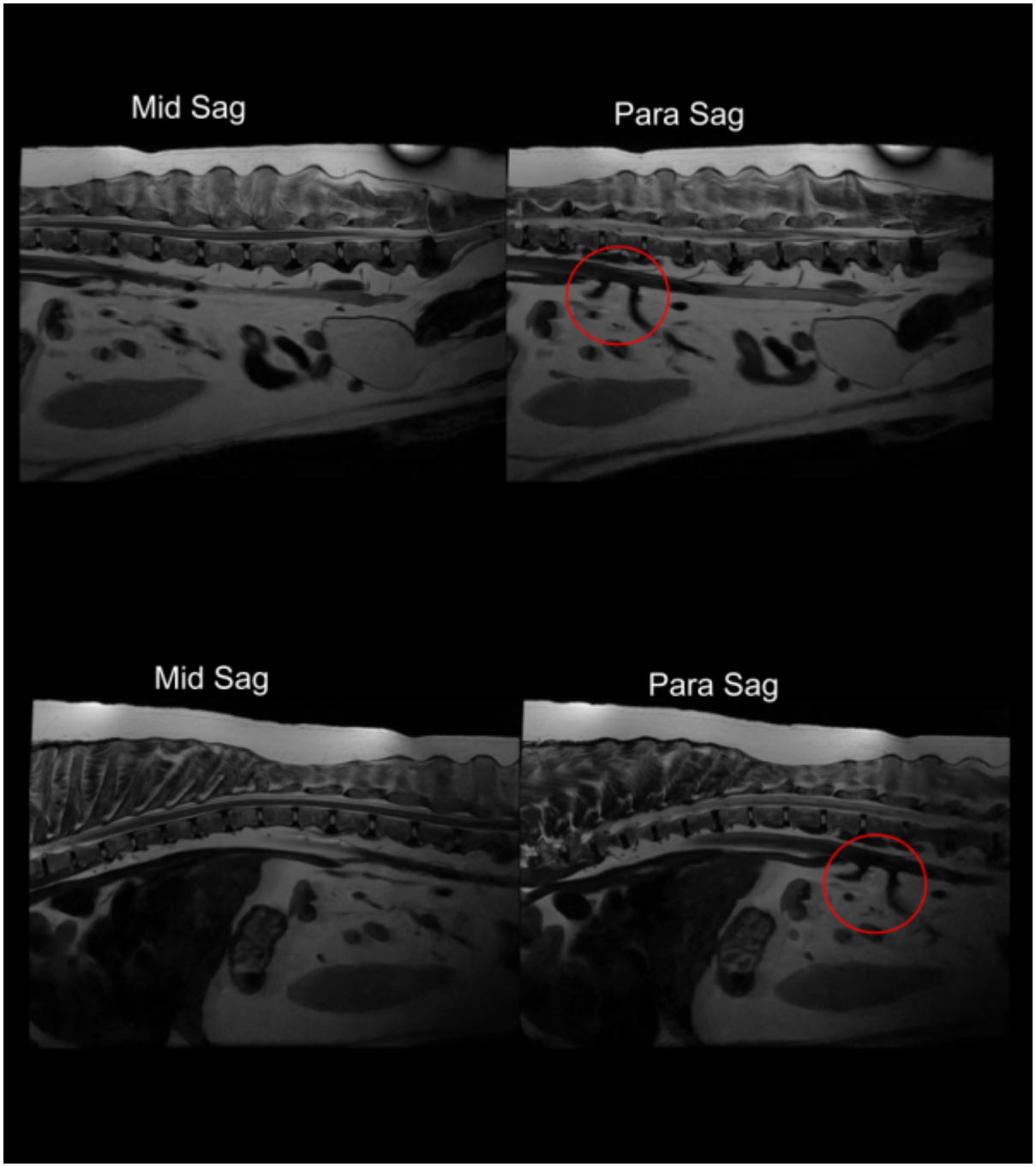
Whole Spine Coverage

With Whole Spine coverage, the FOV for sagittal series should extend from T3 to S2. **Be sure to plan an ODD number of slices to ensure there is at least one true mid-sagittal image.** There are several difficulties and limitations with whole spine imaging:

1. The maximum FOV for scanners varies, and may be limited by the size of the dog, so whole spine coverage is only appropriate for small to medium breeds
2. The maximum number of coils that may be active at a time may be limited (GE)
3. Positioning becomes more difficult, as slight curvatures of the spine will limit the accuracy of sagittal imaging, necessitating repositioning, or very thin slices.
4. The scanning technologist will have to do a lot of 'zoom/pan' at the time of scanning to locate pathology and plan axials

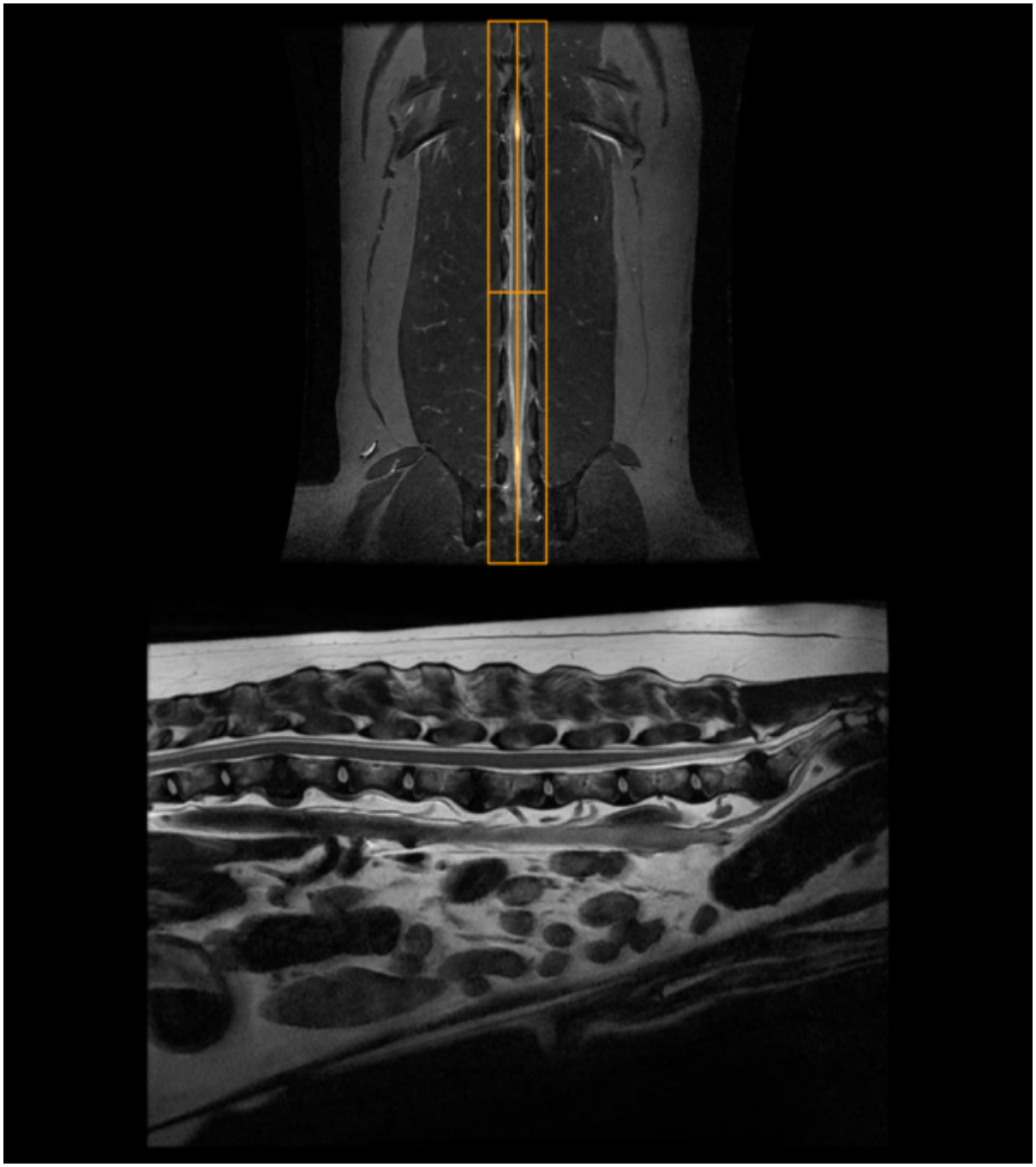
Separate Thoracic and Lumbar

With separate Thoracic and Lumbar sagittal acquisitions, there are different coverages to consider. For a typical Lumbar sagittal, the FOV should extend from T11 to S2. For a typical Thoracic sagittal, the FOV should extend from T3 to L3. Much like all sagittal planning in the spine, **be sure to use and ODD number of slices**. One important consideration for separate sagittal acquisitions is that it is necessary to ensure overlap between the two acquisitions, and accurate counting of the vertebrae. a reliable anatomic marker for ensuring overlap is the mesenteric arteries coming off from the aorta. If they are present on both Lumbar and Thoracic series, then overlap is guaranteed. It is important to note that these vessels may not be on the mid sagittal slice, but rather a parasagittal image, as shown below. The mesenteric arteries are circled in red.



Sagittal Plane

On a dorsal image, plan the slices parallel with the spinal cord, with the slices extending at least out to the transverse processes of the vertebrae. See above for the different FOV options for Separate or Whole Spine imaging.



Axial Plane

On a mid-sagittal image, plan axial slices perpendicular to the spinal cord. Unlike the cervical spine, the angle for the intervertebral disc and the spinal cord are very well aligned and can be considered equivalent. There are two variations of axial acquisitions, Single Stack or Multi Stack. This is largely up to clinician preference, but there are some good practices to consider. - With disc disease, extrusions tend to be fairly localized, though in rare cases may extend cranially or caudally. Multi Stack is often appropriate and more time efficient for this, especially when assessing a large number of discs. -