

## Spine MR Protocols

Sp 1: Cervical spine MRI without contrast

Sp 2: Pre- and post-contrast cervical spine MRI

Sp 3: Pre- and post-contrast cervical spine MRI (multiple sclerosis protocol)

Sp 4: Thoracic spine MRI without contrast

Sp 5: Pre- and post-contrast thoracic spine MRI

Sp 6: Lumbar spine MRI without contrast

Sp 7: Pre- and post-contrast lumbar spine MRI

Sp 8: Thoracic spine *or* lumbar spine MRI without contrast (vertebroplasty protocol)

Sp 9: Thoracic spine MRI without contrast (MR myelogram protocol)

Sp 10: Thoracic spine or lumbar spine MRI pre- and post-contrast (metastatic spine survey protocol)

## **Sp 1: Cervical spine MRI without contrast**

Indications: pain, radiculopathy, ligamentous or spinal cord trauma.

Sequences:

- Sagittal T1 SE
- Sagittal T2 FSE
- Sagittal STIR
- Axial MEDIC GRE or T2 FSE
- Oblique sagittal T2 FSE (right and left).
- *Opt:* coronal T2 FSE (scoliosis)

Comments:

- Use for post-operative cervical spine patients as well.
- Perform axial T2 FSE instead of MEDIC when surgical hardware is present.
- Oblique sagittal T2 FSE sequences are no longer optional.

## **Sp 2: Pre- and post-contrast cervical spine MRI**

Indications: tumor, infection, transverse myelitis.

Sequences:

- Sagittal T1 SE
- Sagittal T2 FSE
- Sagittal STIR
- Oblique sagittal T2 FSE (right and left).
- Axial MEDIC GRE or T2 FSE
- Post-Gd sagittal T1 SE with fat saturation
- Post-Gd axial T1 SE with fat saturation
- *Opt:* coronal T2 FSE (scoliosis)

Comments:

- A history of cancer by itself does not entail IV Gadolinium; contrast should be given if referring physician specifically suspecting bony or epidural metastasis, or if suspicious finding seen on pre-contrast images.
- For issues of atlanto-axial instability (ie., with rheumatoid arthritis), begin axial GRE images from foramen magnum instead of C2-3.

### **Sp 3: Pre- and post-contrast cervical spine MRI (multiple sclerosis protocol)**

Indications: assess for multiple sclerosis.

Sequences:

- Sagittal T1 SE
- Sagittal double echo PD and T2 FSE
- Sagittal STIR
- Oblique sagittal T2 FSE (right and left).
- Axial T2 fast spin echo
- Post-Gd sagittal T1 SE with fat saturation
- Post-Gd axial T1 SE with fat saturation
- *Opt:* coronal T2 FSE (scoliosis)

Comments:

- PD FSE sequence may show cervical spine plaques better.
- Sagittal sequences: 3 mm slice thickness, no gap.
- Axial sequences: 5 mm slice thickness, no gap.
- Minimum 5-minute delay before post-Gd sequences.

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## **Sp 4: Thoracic spine MRI without contrast**

Indications: pain, radiculopathy.

Sequences:

- Sagittal large FOV T1 SE (include odontoid): place fiducial for determining levels.
- Sagittal T1 SE
- Sagittal T2 FSE
- Sagittal STIR
- Axial T1 SE
- Axial T2 FSE
- *Opt:* coronal T2 FSE (scoliosis)

Comments:

## **Sp 5: Pre- and post-contrast thoracic spine MRI**

Indications: tumor, infection, transverse myelitis.

Sequences:

- Sagittal large FOV T1 SE (include odontoid): place fiducial for determining levels.
- Sagittal T1 SE
- Sagittal T2 FSE
- Sagittal STIR
- Axial T1 SE
- Axial T2 FSE
- Post-Gd sagittal T1 SE with fat saturation
- Post-Gd axial T1 SE with fat saturation
- *Opt:* coronal T2 FSE (scoliosis)

Comments:

- A history of cancer by itself does not entail IV Gadolinium; contrast should be given if referring physician specifically suspecting bony or epidural metastasis, or if suspicious finding seen on pre-contrast images.

## **Sp 6: Lumbar spine MRI without contrast**

Indications: low back pain, radiculopathy.

Sequences:

- Sagittal T1 SE
- Sagittal T2 FSE
- Sagittal STIR
- Axial T1 SE
- Axial T2 FSE
- *Opt:* coronal T2 FSE (scoliosis)
- *Opt:* oblique coronal STIR through sacrum
- *Opt:* oblique coronal T1 spin echo through sacrum.

Comments:

- Axial coverage from L3-4 through L5-S1 by default. Additional coverage more superiorly at tech's discretion to evaluate degeneration as well.
- New optional sequences to be done only when clinician orders lumbar spine AND sacroiliac joints.

## **Sp 7: Pre- and post-contrast lumbar spine MRI**

Indications: tumor, infection, transverse myelitis, surgery *<6 years ago*.

### Sequences:

- Sagittal T1 SE
- Sagittal T2 FSE
- Sagittal STIR
- Axial T1 SE
- Axial T2 FSE
- Post-Gd sagittal T1 SE with fat saturation
- Post-Gd axial T1 SE with fat saturation
- *Opt:* coronal T2 FSE (scoliosis)
- *Opt:* oblique coronal STIR through sacrum
- *Opt:* oblique coronal T1 spin echo through sacrum.

### Comments:

- A history of cancer by itself does not entail IV Gadolinium; contrast should be given if referring physician specifically suspecting bony or epidural metastasis, or if suspicious finding seen on pre-contrast images.
- New optional sequences to be done only when clinician orders lumbar spine AND sacroiliac joints to be evaluated.



**Sp 8: Thoracic spine *or* lumbar spine MRI without contrast  
(vertebroplasty protocol)**

Indications: known compression fractures; evaluate for possible intervention

Sequences:

- Sagittal large FOV T1 SE (include odontoid): place fiducial for determining levels.
- Sagittal T1 SE
- Sagittal T2 FSE
- Sagittal STIR
- Axial T2 FSE: perform through all compression fractures.
- *Opt:* coronal T2 FSE (scoliosis)

Comments:

## **Sp 9: Thoracic spine MRI without contrast (MR myelogram protocol)**

Indications: central canal stenoses, cord avulsion injuries.

### Sequences:

- Sagittal large FOV T1 SE (include odontoid): place fiducial for determining levels.
- Sagittal large FOV T2 FSE
- Coronal 3D T2 FSE SPACE
- Axial SPACE reconstructed images
- Coronal HASTE with fat saturation

### Comments:

- MR myelogram sequences: image the entire spine in 2 series.
- Suggested SPACE parameters: FOV 350 x 350 mm, 1 mm slice thickness, iPAT 3. Reconstructed axial images: 4 mm thick.
- Suggested HASTE parameters: FOV 350 x 350 mm, 60 mm thick slab, iPAT 2.

## **Sp 10: Thoracic spine *or* lumbar spine MRI with and without contrast (metastatic spine survey protocol)**

Indications: known vertebral metastases; radiation therapy evaluation for cord compression

Sequences:

- Sagittal large FOV T1 SE (include odontoid): place fiducial for determining levels.
- Sagittal T1 SE
- Sagittal T2 FSE
- Sagittal STIR
- Post-Gd sagittal T1 SE with fat saturation
- Axial T2 FSE.
- Post-Gd axial T1 SE with fat saturation.
- *Opt:* coronal T2 FSE (scoliosis)

Comments:

- Perform axial images only through areas of enhancing epidural tumor with central canal and/or foraminal stenoses.