

# BRYAN RADIOLOGY ASSOCIATES

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## Spine MR Protocol

Latest revision: 2020-11-29

### MR20: CERVICAL SPINE routine [FAQ 20](#)

FSE (TSE) T2 SAG slice 3 skip 0 (a)

T1 SAG slice 3 skip 0

T1 AX slice 3 skip 0

T2 and/or T2\* AX: (b)

GE: 3D FRFSE T2 AX

3D T2\* GRE AX

Siemens: MEDIC 2D AX

Philips: T2 FFE AX

T2 Balanced FFE AX

Toshiba: True SSFP AX

3D FE AX

(a) If there is severe patient motion, then in place of FSE (TSE) T2 SAG, substitute the following:

GE: SSFSE T2 SAG

Siemens: T2 FISP SAG

Philips: try SS TSE T2 SAG or T2 Balanced FFE SAG

Toshiba: T2 FASE SAG or T2 True SSFP SAG

(b) If you see during the SAG's that there is patient swallowing, or the patient otherwise can't hold still, don't bother doing any 3D AX's. Just do the non-3D T2 or T2\* AX's.

(b) If metallic hardware causes too much magnetic susceptibility artifact, then skip the gradient echo (a.k.a. field echo) AX's, and instead do a FSE (TSE) T2 AX *and* a FSE (TSE) T1 AX. Note: we routinely do not do T1 AX; we only do it for this type of situation.

(b) For non-3D AX's, cover from just above C3-4 to just below C7-T1. Use a single slab. However, if the spinal lordotic curvature is too great, then use 2 slabs. The objective is to have each AX image slice roughly parallel to the intervertebral discs. If it looks like some AX slices are going to be more than 20 degrees off from the plane of the disc, then you may have to use 2 slabs. Use your judgement.

(b) For the 3D sequences, if you can, cover from foramen magnum to T1-2. Only single slab, no 2 slab option on 3D.

### MR21: CERVICAL SPINE trauma

Same as MR20 Cervical spine routine, but

Add STIR SAG

Drop T1 AX

## **MR22: CERVICAL SPINE contrast (non-infection) [FAQ 20](#)**

It's a long scan: when scheduling, need approximately 1 hour slot

Radiologists: don't tell the tech's to add any more sequences, like pre-GAD T1 AX [FAQ 22a](#)

T1 SAG

FSE (TSE) T2 SAG (a)

STIR SAG

FSE (TSE) T2 AX (a) [FAQ 22b](#)

T2\* AX

GE: GRE AX

Siemens: MEDIC 2D AX

Philips: FFE AX

Toshiba: Field echo AX

GAD T1 SAG

GAD T1 AX

On all AX's start at foramen magnum to just below C7-T1.

(a) For GE machines that have it, use FRFSE T2 instead of the standard FSE T2, for both SAG and AX.

## **MR23: CERVICAL SPINE contrast infection**

Same as MR22 Cervical spine contrast (non-infection), except the GAD T1 SAG and GAD T1 AX should both be with FATSAT [FAQ 23](#)

## **MR24: LUMBAR SPINE routine**

T1 AX

T1 SAG slice 3, skip 0

FSE (TSE) T2 SAG slice 3, skip 0

FSE (TSE) T2 AX

STIR SAG

AX slices should be angled through the last 5 disc spaces from L1-2 through L5-S1

With regard to the *spinal canal*, do not just do AX slices through the disc space levels alone. Instead, be sure to include those portions of the spinal canal in between the disc space levels. In most cases, you can use 1 AX slab to cover L1-2, L2-3, and L3-4; then 2 other more steeply angled separate slabs to cover L4-5 and L5-S1.

If there is a transitional level, you should still do both FSE (TSE) T2 AX and T1 AX slices through the last 5 disc spaces, including the lowest level (i.e. the transitional level itself).

Pay close attention to the FSE (TSE) T2 SAG images as you scan: if there is a significant disc herniation or bone spur at T12-L1, then do additional TSE (FSE) T2 AX through that/those additional level(s) as appropriate. For the sake of time, don't do additional T1 AX through those extra levels.

## **MR25: LUMBAR SPINE contrast**

Do the MR24 L-spine routine protocol, then add:

STIR SAG

GAD T1 SAG slice 3, skip 0

GAD T1 AX through levels of interest

GAD T1 FATSAT AX through levels of interest [FAQ 25](#)

## **MR26: THORACIC SPINE routine**

Large FOV SAG including entire C-spine and entire L-spine for counting levels (suggestion: use vitamin E pill)

FSE (TSE) T2 SAG slice 3, skip 0. Cover at least T1-2

STIR SAG slice 3, skip 0

T1 SAG

FSE (TSE) T2 AX

How and which levels to do AX will depend on what you see on the FSE (TSE) T2 SAG:

- 1) If you see just disc herniations and/or bone spurs, then do 4 angled AX slices, slice 3 skip 0, through each and every disc space from T3-4 through T10-11. Unlike the L-spine, you should skip those areas of the spinal canal in between the disc levels.
- 2) If you see significant (not tiny) pathology at T1-2, T2-3, and T11-12 such as moderate or large disc herniations, or bone spurs, especially if there is cord impingement, then do AX through those levels as well as the rest of the T-spine, but use a C-spine coil or L-spine coil as appropriate. [FAQ 26](#)
- 3) If you see nothing abnormal, do the same as 1).
- 4) If you see compression fractures with bony retropulsion or cord impingement, be sure to include all portions of such on the AX, not just the disc space levels.
- 5) If you see pathology other than disc herniations, bone spurs, and old benign compression fractures on the SAG, then convert to MR27: Thoracic spine with contrast. If you're not sure, ask a radiologist to see all 3 SAG sequences and let him decide. If you're not sure and all radiologists are busy, then write a note on the PACS stating such, and just do MR26: routine T-spine.

## **MR27: THORACIC SPINE contrast**

Do the MR26: Thoracic spine routine, but with the following modifications:

- 1) Add the following:

GAD T1 SAG

GAD T1 FATSAT SAG

GAD T1 AX

- 2) For all AX coverage (both the FSE (TSE) T2 AX and the GAD T1 AX), cover T1-2 through T11-12, and use 2 large slabs (slice 4, skip 1).

However, if you see on the SAG focal obvious pathology limited only to one area, then cover just that area using 1 slab (slice 3, skip 0)

## **MR28: SPINE emergency rule out acute cord compression**

For after-hours, weekends, or during working hours but no available time slot, or referring physician has ordered all 3: C-spine, T-spine, and L-spine which he insists must be done all at the same time immediately.

TSE T2 SAG

STIR SAG

T1 SAG

(All SAG will cover entire C, T, and L-spine)

If you see no cord compression anywhere, then stop. Show a radiologist. You are done if he says he sees no cord compression, or if all radiologists are busy and you see no cord compression.

If extremely pressed for time or patient is moving too much, then only do one sequence, and then quit, no matter what (no AX):

GE: SSFSE SAG

Siemens: FISP SAG

Philips: Single Shot TSE SAG

Toshiba: try FASE or FE SAG

If you see cord compression, add the following AX limited to the level(s) of cord compression, if you have time and the patient is not moving too much:

FSE (TSE) T2 AX

GAD T1 FATSAT AX

GAD T1 FATSAT SAG