SPINE EXAMS 1-14-2020

CERVICAL SPINE

**Add Foraminal Obl Sag T2 if protocoled by community rads as a C-sp w/o. No need to run obl if it's ordered with contrast, or with a total spine order. Please run even if they have had a prior surgery/fusion. Thanks.

1. 3 pl loc
2. Sag T1 ****IMAGES****
3. Sag T2
4. Sag FSTIR (STIR PROPELLER on 750w scanners)
5. Ax T1
6. Ax T2* MERGE (Ax T2 FRFSE for metal)
   ►**OPTIONAL CONTRAST**
7. +c Sag T1 **fat sat --SHIM on 3T**
8. +c Ax T1 **fat sat (**no fat for MS or Drop Mets)**-SHIM 3T**

OPT Contrast:
Multihance
.1 mmol/kg
max 20 mL
Low eGFR inpatient dosing: no change

FORAMINAL OBLIQUE CERVICAL SPINE (Dr. Hanna/Guebbels)

1. 3 pl loc
2. Sag T1 ****IMAGES****
3. Sag T2 FAT
4. Ax T2 * MERGE
5. OBL Sag T2—Angle Perpendicular to RT C-5/6 Foramina on Axial image
6. OBL Sag T2—Angle Perpendicular to LT C-5/6 Formaina on Axial image

THORACIC SPINE

1. 3 pl loc TOP **INCLUDE SKULL BASE**
2. 3 pl loc BOT **INCLUDE COCCYX**
3. Sag T1
►T1 through conus (usually about L1)
4. Sag T2
5. Sag FSTIR
6. **Adults**: Ax T2 FRFSE no fat
   Peds: Ax T2* GRE
   ►**OPTIONAL CONTRAST**
7. Ax T1 **PRE** contrast
8. +c Sag T1 **fat sat SHIM on 3T**
9. +c Ax T1 **fat sat** (no fat for MS or Drop Mets) **SHIM on 3T**

Can scan upper/lower axials for better fat sat and so they are angled to the disc spaces

OPT Contrast:
Multihance
.1 mmol/kg
max 20 mL
Low eGFR inpatient dosing: no change
****IMAGES****

LUMBAR SPINE

1. 3 pl loc ****IMAGES****
2. Sag T1 **Superior FOV at top of T-11**
   ►Cover through neuro foramina
3. Sag T2 fat sat **Superior FOV at top of T-11**
4. Sag PD
5. Ax T2 **Bottom 3 disks, higher as needed**
   ►Extend axials through terminal end of thecal sac
   ►**OPTIONAL CONTRAST**
6. Ax T1 **PRE** contrast **Bottom 3 disks, higher as needed**
7. +c Sag T1 **fat sat Superior FOV at top of T-11**
8. +c Ax T1 **fat sat Bottom 3 disks, higher as needed**
   SHIM FAT SAT Sequences on 3T

****Add Sag PD MAVRIC and Sag FLUID MAVRIC if requested by Dr. Bice---request should mention "MAVRIC" Please e-mail Megan with examples. Thank you**

OPT Contrast:
Multihance
.1 mmol/kg
max 20 mL
Low eGFR inpatient dosing: no change

QUICK SPINE (Syrinx or Tethered Cord/Dimple)

1. 3 pl loc ssfse TOP **INCLUDE SKULL BASE**
2. 3 pl loc ssfse BOT **INCLUDE COCCYX**
3. Sag T2 SSFSE TOP **PLACE Ant SAT**
4. Cor T2 SSFSE TOP
5. Sag T2 SSFSE BOT **PLACE Ant SAT**
6. Cor T2 SSFSE BOT
7-10. Ax T2 SSFSE C, T & L sp (thru Coccyx) **PLACE Ant SAT**
STOP if protocoled Syrinx

If protocol Tethered Cord/Dimple add:
run when child at calmest

7. Ax T1 FSE **T-11- Coccyx PLACE Ant SAT**
8. Sag T1 FSE **T-11- Coccyx PLACE Ant SAT**

Repeat Sag T1 with 2 nex if motion. Important scan to repeat

USE ANTERIOR SAT BAND ON SAGITTALS

REPEAT ONLY ONCE!

PLACE MARKER TO THE **RIGHT** OF THE DIMPLE IF THERE IS ONE.

FLOW – FORAMEN MAGNUM

NEUTRAL:

1. **Sag T2 FSE CUBE Non gated, centered at C 1-2**

****If done with a spine, it can be a limited slab. No Fat Sat or FC on this scan**

2. **Ax Fast PC - 8 slices ➔Perpendicular to cord at C 1-2 level**
   ➔1st slice just above foramen magnum
   ➔Place slices superior to inferior
3. **Sag Cine PC 1 slice - midline cord, center at C-3**

OPTIONAL: FLEXION & EXTENSION:

4. **3 pl loc FLEX 5. FLEX Sag T2 7 - 8 slices, anatomical images**
6. **3 pl loc EXT 7. EXT Sag T2 7 – 8 slices, anatomical images**

Peripheral gating

+C ONLY Total Spine Drop Mets

**Pick sequences from total spine protocol
**not to be used with first time eval for drop mets
**to be used for brain tumor follow up where they are looking for drop mets
**Only Ax T2 if requested
***Always run Sag T2's!!!
1. 3 pl loc **INCLUDE SKULL BASE** 2. 3 pl loc BOT**INCLUDE COCCYX**
3. +C **C**-Sag T1 FAT 4. +C **C**-Sag T2 5. +C C- Ax T1 no fat
6. +C **T**-Sag T1 FAT 7. +C **T**-Sag T2 8. +C T-Ax T1 no fat
9. +C **L**-Sag T1 FAT 10. +C **L**-Sag T2 FAT 11. +C L-Ax T1 no fat

Contrast:
Multihance
.1 mmol/kg
max 20 mL
Low eGFR inpatient dosing: no change

ED Total Spine Fast Screen

1. 3 pl Loc TOP 2. 3 pl Loc Bot (not thru coccyx) 3. C- Sag STIR
4. C- Sag Cube T1 5. T- Sag STIR 6. T- Sag CUBE T1
7. L—Sag STIR 8. L- Sag T1 CUBE
►**OPTIONAL CONTRAST**: 9. C- Sag CUBE T1 FAT
10. T- Sag T1 CUBE FAT 11. L-Sag T1 CUBE FAT

** CUBE sequences--Don't decrease #slices in. Place Right & Left Sat Bands---Do Not place an anterior sat band—this increases wrap.
**Ax Reformats of CUBE Series-ALI check images while running last Scan
*If no additional scanning required, change order to Pediatric Quick Spine.
*If Ax T2's of entire spine requested, keep order as Total Spine w/o
*If additional imaging in one level requested, change that level to a wo (or w/wo) and add the other two levels as limited charges.
*If contrast is needed, run Sag T1 CUBE FAT, change order to Total Spine w/wo. Radiologist might request additional axial scans. There is no limited charge available if contrast is given.

Best on Gems
ED will Order Tot Sp w/o—radiologist will protocol Tot Sp Fast ED Screen—change order as needed (see instructions to the left and by scanner)

PEDIATRIC 2 PART (0-2yr or 2-under 6yr) TOTAL SPINE

1.3 pl loc **TO INCLUDE SKULL BASE** 2. 3 pl loc BOT **INCLUDE COCCYX**
3. TOP Sag T1 **C1-Bottom of T8** 4. TOP Sag T2
5. BOT Sag T1 **Top of T7- end of thecal sac** 6. BOT Sag T2 FS
7. **C** Ax T2* MERGE (Ax T2 FRFSE for metal)
8. **T** Ax T2 FRFSE (No fat)/PEDS AX T2* GRE
9. **L** Ax T2

****only do Pre-Ax T1 if requested or looking for tethered cord (T8-Coccyx)**
►**OPTIONAL CONTRAST**
(Multihance .1mmol/kg, Max 20 mL)
10.+c **C** Sag T1 **fat sat** 11. +c **T** Sag T1 **fat sat** 12. +c **L** Sag T1 **fat sat**
13.+c **C** Ax T1 **{fat sat}** 14. +c **T** Ax T1 **{fat sat}** 15. +c **L** Ax T1 **{fat sat}**
****NEURO Drop Mets, MS, intra dural pathologies use +c Ax T1 no fat**
****All MSK and some neuro cases use Ax T1 FAT **call rad if unsure**

****OK to do upper/lower axials in 0-2yr olds)****

TOTAL SPINE 3 PARTS (6YR OLD-ADULT)

1. 3 pl loc TO **INCLUDE SKULL BASE**
2. 3 pl loc BOT **INCLUDE COCCYX**
3. **C**-Sag T1 6. **T**-Sag T1 9. **L**-Sag T1
4. **C**-Sag T2 7. **T**-Sag T2 10. **L**-Sag T2 FAT
5. **C**-Ax T2 * MERGE 8. **T**-Ax T2 FRFSE 11. **L**- Ax T2 (**T**-PEDS Ax T2 * GRE)

****only do Pre-Ax T1 if requested or looking for tethered cord (T8-Coccyx)**
OPT Contrast (Multihance .1mmol/kg, Max 20 mL)
10. **C**- Sag T1 FAT 12. **T**-Sag T1 FAT 14. **L**-Sag T1 FAT
11. **C**-Ax T1 {FAT} 13. **T**-Ax T1 {FAT} 15. **L**-Ax T1 {FAT}
****NEURO Drop Mets, MS, intra dural pathologies use +c Ax T1 no fat**
****All MSK and some neuro cases use Ax T1 FAT**
****call rad if unsure**
*****MSK Total Spine at RP ONLY—include T-Sag STIR and L-Sag PD**

Contrast:
Multihance
.1 mmol/kg
Max 20 mL
Low eGFR inpatient dosing: no change

NAT Spine (Tot Spine 2 parts)

1. 3 pl loc TOP **INCLUDE SKULL BASE** 2. 3 pl loc BOT **INCLUDE COCCYX**
3. TOP Sag T1 **C1-Bottom of T8** 4. TOP Sag STIR
5. BOT Sag T1 **Top of T7- end of thecal sac** 6. BOT Sag T2 FS
7. TOP Ax T2* MERGE 8. BOT Ax T2 FRFSE
9. TOP Cor T2 CUBE FLEX (Cor T2 IDEAL if CUBE FLEX not an option)
10. BOT Cor T2 CUBE FLEX (Cor T2 IDEAL if CUBE FLEX not an option)

OPTIONAL ADDITIONS TO EXAMS

DWI (Diff Dir All, Asset on) (C, T or Lsp)
Ax DWI
Sag DWI
Process ADC maps

TRAUMA:
(C, T and L spine)
Add: Cor T2 IDEALarc (or Cor T2 FAT 4 ch coil)
C-SP ADD: Sag T2 fat sat (instead of Sag T2)
L-SP ADD: Sag FSTIR

Tethered Cord:
Ax T1 T8 thru coccyx
Cor T2 fat sat- T6 through coccyx
(PLACE MARKER TO THE **RIGHT** OF THE DIMPLE IF THERE IS ONE)

SCOLIOSIS:
Cor SSFSE upper & lower
Axial T2 (all levels from tot sp protocol)
Ax T1 Conus through thecal sac

SI joints or Sacrum: Add to L-sp
Cor T1 Obl ►sacrum
Cor STIR Obl►sacrum
If contrast given:
Cor T1 FAT +c ►sacrum

VETERBROPLASTY
Add: Sag FSTIR &
Ax T1 through compressed vertebrae

Sag 3d Fiesta (NAT) Non Accidental Trauma (found in 3d spine folder)

TRICKS for MRA–AVM: Multihance Request: MRA Spinal Canal w contrast
PEDS: .05 mmol/kg per inj.
ADULTS: 10 mL per inj.
MAX 20 mL.Inj @ 2mL/sec
Monitored, 2 injections
1. Sag TRICKS
2. Cor TRICKS
►scan mask, scanner pauses, inject and scan with a 5 second scan delay (2 seconds for small peds)
May request "slow flow"

SCREENING LOCS—
UPPER/LOWER SAG SSFSE
Localizers—Place Sat bands so Abdomen doesn't show in the FOV

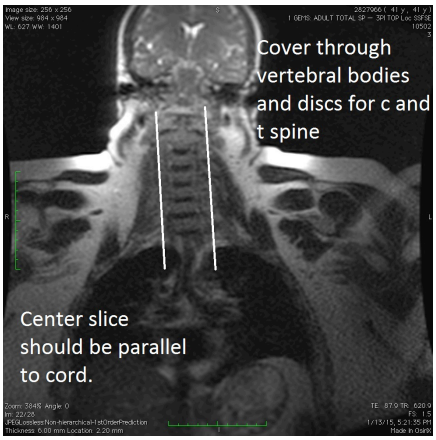
Spondylo CUBE—ONLY RUN Sag T2 CUBE in addition to routine protocol. PEDS can protocol a "SPONDYLO" protocol. See AFCH SPINE

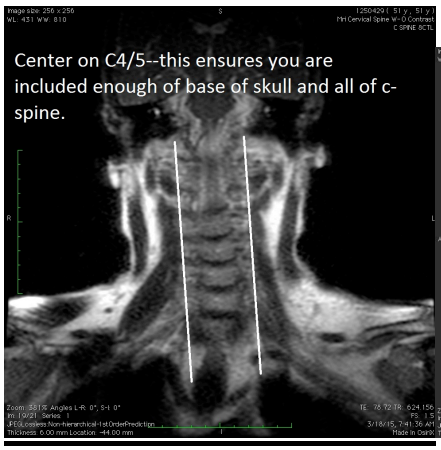
Osseous METS:
1. Sag FSPGR InPhase
2. Sag FSPGR Out of Phase
3. Ax DWI b900 (diff dir 3in1)—post process ADC map in Functool—send to ALI

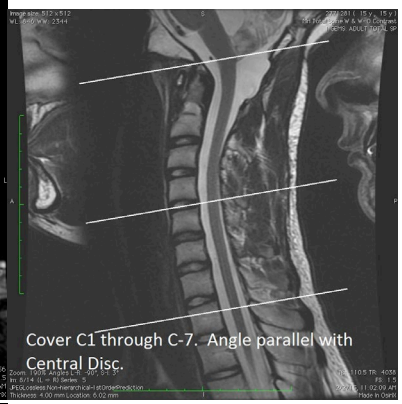
****PLACE ANTERIOR SAT ON ALL AXIAL AND SAGITTAL SEQUENCES**
**** Use posterior sat bands as long as pathology isn't being obstructed.**

FOR METAL: Use MARS **T2 FAT-use STIR **T1 FAT Take off FAT SAT IDEAL ONLY if requested **If images are undiagnostic, MR3, MR4, and TAC1 have a "MAVRIC Spine" protocol. Pt can be brought back if deemed necessary by radiologist or if already on scanner you can TRY to run a SAG T1 MAVRIC, SAG FLUID MAVRIC, Ax PD MAVRIC, and Ax FLUID MAVRIC.

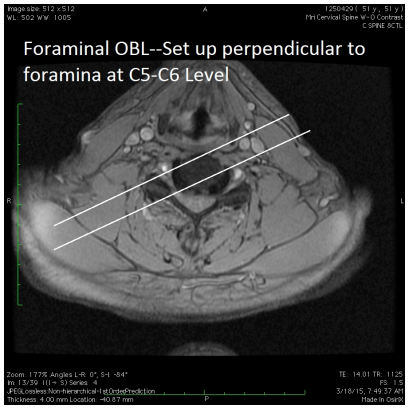
Cervical Spine Set up:





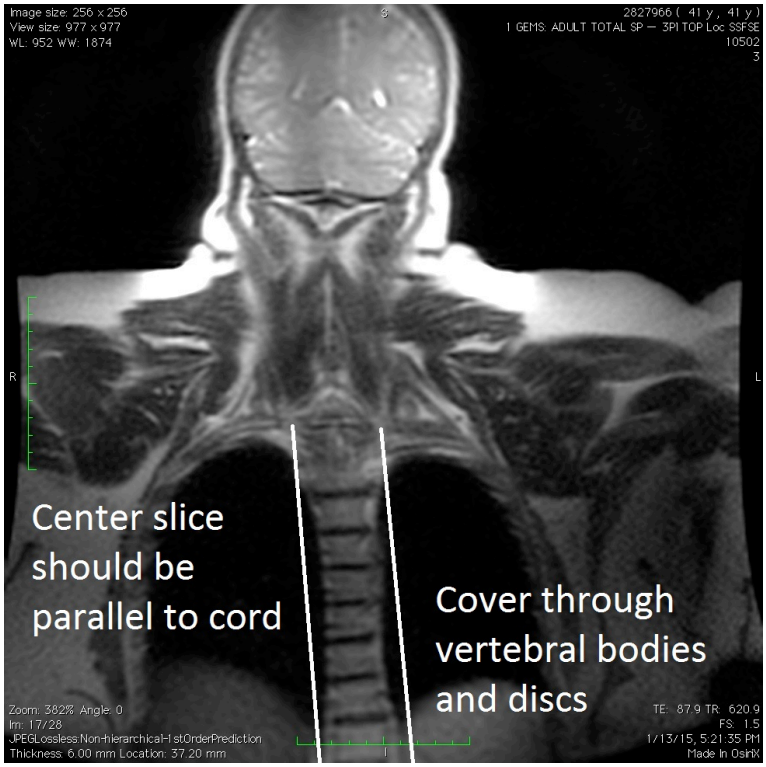


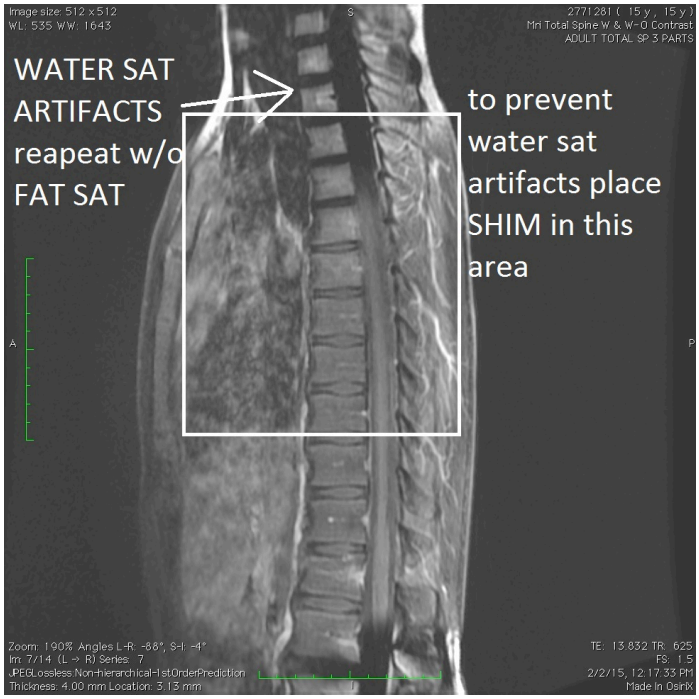
Foraminal OBL SAG:



Back to Protocol

Thoracic Spine Set up:





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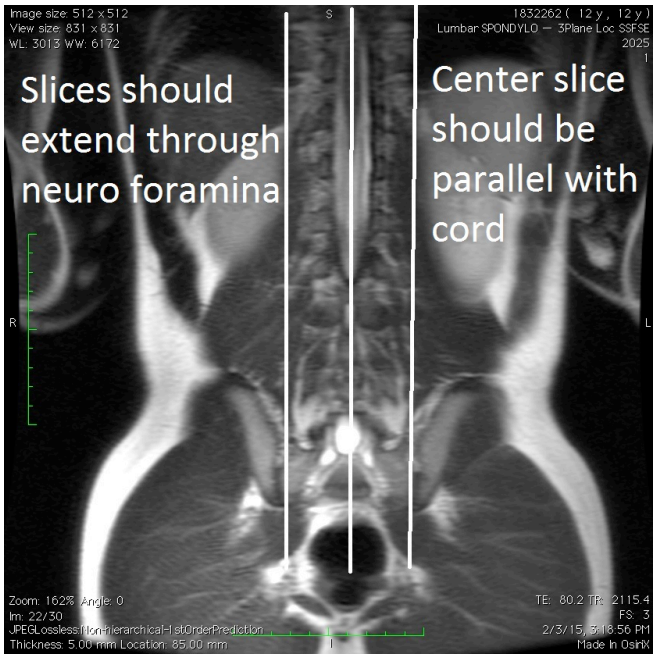
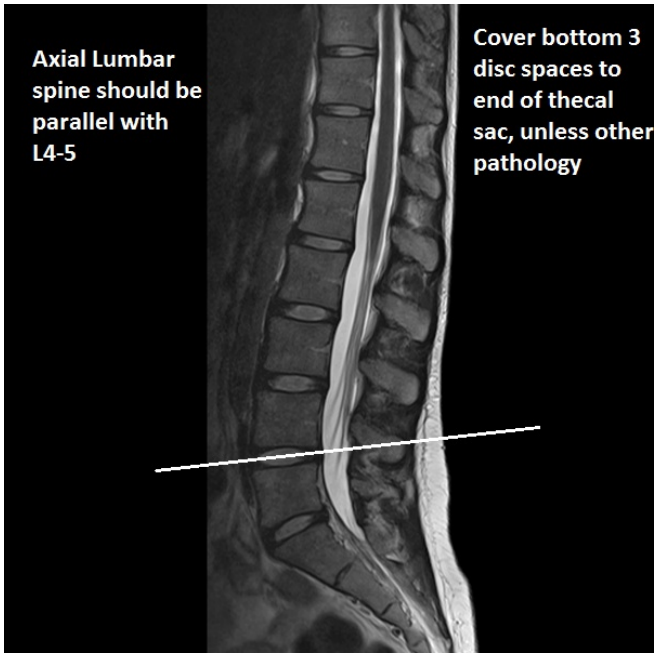
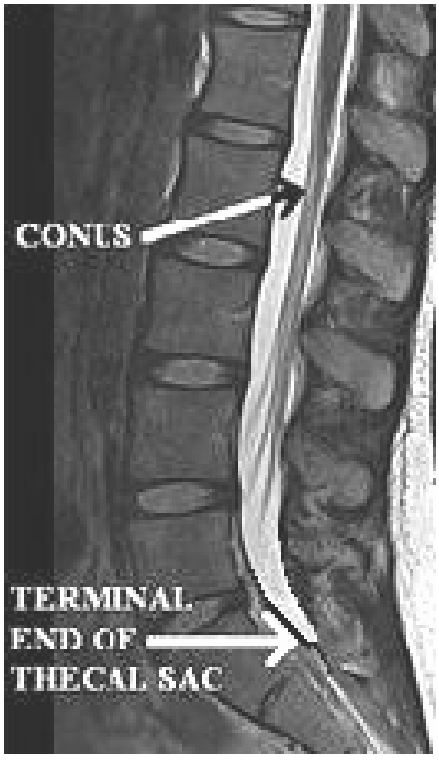
Lumbar Spine Set up:







- **Back to Protocol* *

- When scanning a lumbar spine with a disc higher than the surgical site (lower 3 Lsp. Discs), acquire an upper T2 through the disc. A pre/post contrast axial T1 in an area other than surgical site is not needed.
    - **No upper axial T1 imaging needed for herniated disc:**