MSK LOWER EXTREMITY and LEGS   1-9-23

KNEE

When screening patient, ask these questions and add to screening from notes. Tech will add to study notes:
- did you injure your knee? If so when?
- Was there surgery on this knee? If so, did they remove cartilage/meniscus?

1. 3 Pl Loc   **Image**
2. Sag PD—Include all bone through ligaments (Obl to condyles)
3. Sag T2 cl fat
4. Ax T2 cl fat-4 slices above patella through tib/fib joint
5. Cor PD—If protocoled Knee Pain/Menisci/Ligaments or Synovitis
   Cor T1—If protocoled Knee AVN/OCD/FX
6. Cor PD cl fat –Popliteal Artery through patella
#7---RP1, RP2, SP1, 450w or if Coil doesn't allow acceleration
7. Obl Ax PD cl FAT Through Meniscus
#8 3T and ARTIST Scanners:
8. Sag PD CUBE Fat (Obl to condyles)
      Ax, Sag, Cor reformats sent to ALI_STORE
#9 ARTIST Scanners, MR5, MR6, RP3
9. Sag PD CUBE (Obl to condyles)
Synovitis: 10. +C Ax T1 Fat   11. +C Sag T1 Fat
** METAL--SCAN Routine Knee (keep FAT SAT on), but add an additional Sagittal STIR

Request:
MRI Knee wo
      or
MRI Knee wo/w

USE 8 or 16 ch knee coil when possible Opt 2: 16 ch wrap coil

Contrast:
Multihance
.1mmol/kg
Max 20 mL
Low eGFR inpatient Dose: No Change

Knee Osteo/Abscess or Thigh/Calf w/o or Osteo/Abscess

**Try to get one slice down middle of bone
If there is a small ROI (tumor, mass, or area of pain) decrease FOV after large FOV COR STIR. Ensure to use thinner Axial Slices (5/1) to ensure area of interest is adequately covered. Call radiologist to check if questions

1. 3 Pl loc   ►SKIN TO SKIN
2. Cor T1
3. Cor FSTIR (Knee—Cor T2 Fat)
4. Sag T1
5. Sag FSTIR (Knee—Cor T2 Fat)
6. Ax T1
7. Ax T2 dk fat **(upr and lwr stack for long bones)**
► Thigh or calf Axial scans: (5/1.5 or 7/3 as needed)
8. +c Cor T1 dk fat
9. +c Sag T1 dk fat
10. +c Ax T1 dkfat **(upr and lwr stack for long bones)**
►Metal /poor fat sat: for Ax T2 FAT substitute STIR or T2 No FAT. For T1 FAT substitute T1 No FAT.
Only do IDEAL if requested by radiologist.

Request:
MRI wo or w/w
►Thigh
►Calf
►Knee

Contrast:
Multihance
.1mmol/kg
Max 20 mL

Low eGFR inpatient Dose: No Change

HAMSTRING or QUADRICEPS INJURY

►Place marker at max pain or at upper & lower limits
►Prox injury: Prox 2/3 thigh → above ischial tuberosity
►Distal injury:Distal 2/3 thigh→below knee, incl prox tibia
1. 3 Pl loc
2. & 3. Cor T1 & Cor T2 dk fat   (5/1.5)
4. & 5. Sag T1 & Sag T2 dk fat   (5/1.5)
6.& 7. Ax T1 & Ax T2 dk fat   (5/1.5 or 7/2 as needed)

Request:
MRI Thigh wo
Coil:
8 Ch or
12 Ch Body
          array

QUICK TIBIA (FOR SHIN SPINTS ONLY)

1. 3 Pl loc   ►MARKER ON POINT OF MAXIMAL PAIN
2. Sag SSFSE (24 fov)   Center on single marker
3. Ax T2 fat   (5/2.5 16 fov) 32 slices with the center slice on marker

NEUROGRAM (See Lower Ext Neurogram instruction sheet)

MSK TIPS:
- **Ensure extremity of interest is as isocenter as possible**
- **SHIM all Fat sat scans!!**
- **Use Smallest coil possible to ensure coverage for anatomy**

Include in Study notes: Date of injury? Previous surgery?

TIBIAL STRESS FRACTURE

►Place marker at max pain or at upper & lower limits.
1. 3 Pl loc   **center over area of pain**
2. Sag FSTIR   (4/.4)   **IMAGES**
3. Ax T1   (3/1.5) **cover through area of pain/pathology**
   ►if patient has pain through the entire tibia or cannot localize pain instead of 3/1.5, run Axials at 5/1
4. Ax T2 dk fat (3/1.5)
5. Long Axis T1 Perpendicular to edema (3/0) (see images)
6. Long Axis T2 dk fat Perpendicular to edema (3/0)
   ►If edema cannot be seen, oblique sagittally to tib/fib

Request:
MRI Calf w/o

Coil:
8 ch Cardiac
Gems:
30 Small

THIGH OR CALF
(Not for hamstring injury, Quadriceps tear, or Tibial stress FX)

►Place marker at max pain or at upper & lower limits
1. 3 Pl loc
2. & 3. Cor T1 & Cor T2 STIR   (5/2)
4. & 5. Sag T1 & Sag T2 STIR   (5/2)
   & 7. Ax T1 & Ax T2 dk fat   (5/1.5 or 7/3 as needed)

Request:
MRI Calf or Thigh wo

Hip, Thigh, Knee or Calf Tumor less than 8yo

**Try to get one slice down middle of Femur or Tibia
 **Mark scar, lump, or mass and center FOV on ROI. No need to cover a joint. Only cover area of interest.
**Don't need Skin to Skin on both Cor and Sag.
**Must cover all pathology (OK to increase FOV to cover pathology).
**If there isn't a mass or certain area of interest, just pain "everywhere" then we can increase FOV and cover joint to joint.
Call Rad with questions
1. 3 Pl loc
2. Cor T1
3. Cor FSTIR (Knee—Cor T2 Fat)
4. Sag T1
5. Sag FSTIR (Knee—Cor T2 Fat)
6. Ax T1 (5/1)
7. Ax T2 dk fat
8. PRE AX T1 FAT (1 nex-ok if grainy)
9. +c Cor T1 dk fat
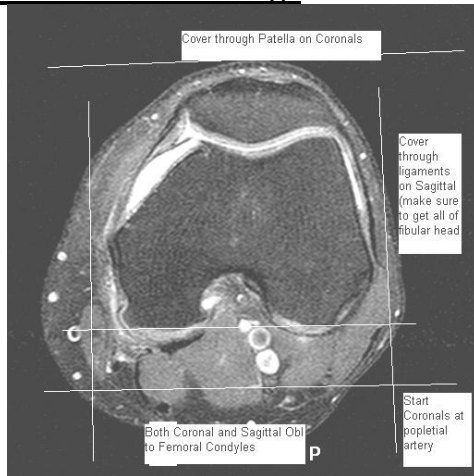10. +c Sag T1 dk fat
11. +c Ax T1 dk fat .

Request:
MRI w/w
►Hip
►Thigh
►Calf
►Knee

Contrast:
Multihance
.1mmol/kg
Max 20 mL

Low eGFR inpatient Dose: No Change

Images

Thigh, Knee, or Calf Tumor (new!! Power Injection!!))

**Try to get one slice down middle of Femur or Tibia
 **Mark scar, lump, or mass and center FOV on ROI. No need to cover a joint. Only cover area of interest.
**Don't need Skin to Skin on both Cor and Sag.
**Must cover all pathology (OK to increase FOV to cover pathology).
**If there isn't a mass or certain area of interest, just pain "everywhere" then we can increase FOV and cover joint to joint.
Call Rad with questions
1. 3 Pl loc
2. Cor T1 (Knee 16FOV, Thigh/Calf 20 FOV 4/1)
3. Cor FSTIR (Knee—Cor T2 Fat)
4. Sag FSTIR (Knee—Cor T2 Fat) (Knee 16FOV, Thigh/Calf 20 FOV 4/1)
5. Ax T2 dk fat (5/1)
6. Ax T1
7. Ax T1 Lava-Flex Pre (In and Out of Phase to SOURCE)
 ---After Pre—ensure to Manual prescan and select done, this will ensure subtractions are accurate!
8. Ax T1 Lava-Flex 30 sec ►Prep scan inject and start timer, start scan at 30sec (45 sec for Calf)—
9. Ax T1 Lava-Flex 2 min
10. Cor T1 Lava-Flex
11. +c Cor T1 dk fat
**Subtract Pre from both post axials—send to ALI_STORE
► Metal: If Tumor is adjacent to metal implant, send Pre Ax T1 Lava-Flex and call RR to see if they want 2d metal sequences instead.
Ax T2 FAT substitute STIR or T2 No FAT. For T1 FAT substitute T1 No FAT.
Only do IDEAL if requested by radiologist

Request:
MRI w/w
►Thigh
►Calf
►Knee

Contrast:
POWER INJECTION
Multihance
.1mmol/kg
Max 20 mL
@2ml/sec

Low eGFR inpatient Dose: No Change

Images

Routine Knee Coverage

Cover through Patella on Coronals

Cover through ligaments on Sagittal (make sure to get all of fibular head

Start Coronals at popletial artery

Both Coronal and Sagittal Obl to Femoral Condyles

P

Tibial Stress FX Instructions:

3 Examples of areas of edema

Step 1. Sag STIR look for bright areas of edema

Step 2. Ax T2 look for bright areas of edema

Example 1	Example 2	Example 3
Periosteal reaction Outside edge of bone	**Muscle tear Soft tissue**	**Stress Fx Within bone**

A

Step 3.   Determine direction of edema

Example 1	Example 2	Example 3
		??? direction

Step 4.   GRx slices long axis perpendicular to edema

Example 1	Example 2	Example 3

Periosteal reaction tibia	**Muscle tear**	**Stress Fx within**
Scan thru tibia & fibula planes if unsure	Scan thru entire leg	Scan in both Sagittal and Coronal

Back to Protocol

Tumor and Osteo protocols:

Ensure to have one slice down the center of the Tibia or Femur: