

Chapter 22. Musculoskeletal Protocols

The protocols used to scan the musculoskeletal system are tailored to each patient and region being examined. The clinical indication for the examination will also affect scan parameters. Radiologists typically review each request for a musculoskeletal CT examination and adjust the protocol to be used to fit the circumstances. Included are some examples of musculoskeletal protocols. Oral contrast media is not indicated for musculoskeletal protocols. Unless specified by the radiologist, examinations are performed without intravenous contrast media as well. Clinical indications that may necessitate IV contrast include infection or tumor. When IV contrast is ordered, 150 mL of LOCM is injected at 2 mL/s, and scanning begins after 60 seconds. When IV contrast is ordered for studies of the upper extremity, inject in the nonsymptomatic arm, if possible.

Shoulder/Scapula



| | | |
|---|----------------------|----------------------|
| Positioning: Patient supine, affected arm at side. Opposite arm above head. | | |
| Scouts: AP and lateral | | |
| Scan Type: Helical | | |
| Start Location: Just above acromioclavicular joint | | |
| End Location: Just below scapular tip | | |
| DFOV: ~25 cm (adjust to cover from skin surface to midline) | | |
| SFOV: Large body | | |
| Algorithm: Bone | | |
| Window Setting: 2000 ww/500 wl (Bone) | | |
| | 16-Detector Protocol | 64-Detector Protocol |
| Gantry Rotation Time | 0.8 sec | 0.8 sec |
| Acquisition (detector width x # detector rows = detector coverage) | 16 x 0.625 = 10 mm | 32 x 0.625 = 20 mm |
| Reconstruction (Slice | 1.25 mm / 0.625 mm | 1.25 mm / 0.625 mm |

| | | |
|--|-----------|-----------|
| thickness/interval) | | |
| Pitch | 0.562 | 0.531 |
| kVp / mA | 140 / 300 | 140 / 300 |
| Reconstruction 2: | | |
| Algorithm: Standard | | |
| Slice Thickness/Interval: 1.25 mm / 0.625 mm | | |
| Window Setting: 350 ww/50 wl | | |
| MPRs: Bone algorithm | | |
| Slice Thickness/Interval: 2mm / 2mm | | |
| Planes: | | |
| <ol style="list-style-type: none"> 1. Oblique-axial (see Fig. 22-6A) 2. Oblique-sagittal (see Fig. 22-6B) 3. Oblique-coronal (see Fig. 22-6C) | | |

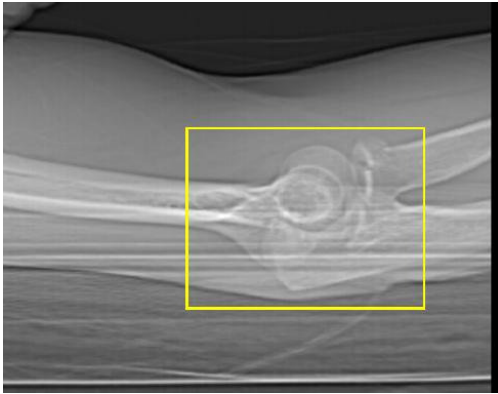
Wrist



| | | |
|---|----------------------|----------------------|
| Positioning: Patient prone, affected arm over head and extended; arm oblique. | | |
| Alternative: Patient supine, arm at side. | | |
| Scouts: AP and lateral | | |
| Scan Type: Helical | | |
| Start Location: Just proximal to distal radioulnar joint | | |
| End Location: At proximal metacarpals | | |
| DFOV: ~10 cm (adjust to include skin surface) | | |
| SFOV: Large body | | |
| Algorithm: Bone plus | | |
| Window Setting: 2000 ww/500 wl (Bone) | | |
| | 16-Detector Protocol | 64-Detector Protocol |
| Gantry Rotation Time | 0.8 sec | 0.8 sec |
| Acquisition (detector width x # detector rows = detector | 16 x 0.625 = 10 mm | 32 x 0.625 = 20 mm |

| | | |
|---|-------------------|-------------------|
| coverage) | | |
| Reconstruction (Slice thickness/interval) | 0.625 mm / 0.3 mm | 0.625 mm / 0.3 mm |
| Pitch | 0.562 | 0.531 |
| kVp / mA | 140 / 300 | 140 / 300 |
| Reconstruction 2: | | |
| Algorithm: Standard | | |
| Slice Thickness/Interval: 0.625 mm / 0.3 mm | | |
| Window setting: 350 ww/50 wl | | |
| MPRs: Bone plus algorithm | | |
| Slice Thickness/Interval: 2mm / 2mm | | |
| Planes: | | |
| <ol style="list-style-type: none"> 1. Axial (see Figure. 22-7A) 2. Coronal (see Fig. 22-7B) 3. Sagittal (see Fig. 22-7C) 4. Oblique-sagittal (see Fig. 22-7D) | | |

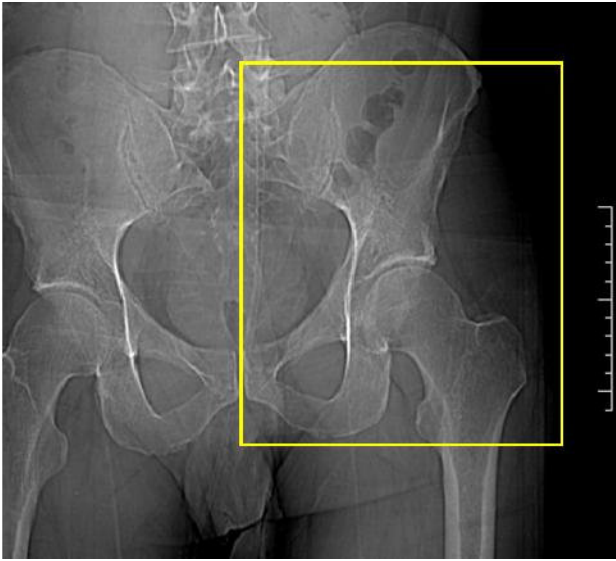
Elbow



| | | |
|---|----------------------|----------------------|
| Positioning: Patient prone, affected arm over head and extended; arm oblique. | | |
| Alternative: Patient supine, arm at side. | | |
| Scouts: AP and lateral | | |
| Scan Type: Helical | | |
| Start Location: Just above elbow joint | | |
| End Location: Just below radial tuberosity | | |
| DFOV: ~15 cm (adjust to include skin surface) | | |
| SFOV: Large body | | |
| Algorithm: Bone plus | | |
| Window Setting: 2000 ww/500 wl (Bone) | | |
| | 16-Detector Protocol | 64-Detector Protocol |
| Gantry Rotation Time | 0.8 sec | 0.8 sec |
| Acquisition (detector width x # detector rows = detector coverage) | 16 x 0.625 = 10 mm | 32 x 0.625 = 20 mm |
| Reconstruction (Slice | 1.25 mm / 0.625 mm | 1.25 mm / 0.625 mm |

| | | |
|--|-----------|-----------|
| thickness/interval) | | |
| Pitch | 0.562 | 0.531 |
| kVp / mA | 140 / 300 | 140 / 300 |
| Reconstruction 2: | | |
| Algorithm: Standard | | |
| Slice Thickness/Interval: 1.25 mm / 0.625 mm | | |
| Window Setting: 350 ww/50 wl | | |
| MPRs: Bone algorithm | | |
| Slice Thickness/Interval: 2mm / 2mm | | |
| Planes: | | |
| <ol style="list-style-type: none"> 1. Axial (see Fig. 22-8A) 2. Oblique-coronal (see Fig. 22-8B) 3. Oblique-sagittal (see Fig. 22-8C) | | |

Hip/Proximal Femur



| | | |
|--|----------------------|----------------------|
| Positioning: Patient supine, legs flat on table (no cushion or wedge under knees). | | |
| Scouts: AP and lateral | | |
| Scan Type: Helical | | |
| Start Location: Just above sacroiliac joints | | |
| End Location: Approximately 4 cm below lesser trochanters (include entire fracture if present) | | |
| DFOV: ~30 cm (adjust to include skin surface) | | |
| SFOV: Large body | | |
| Algorithm: Bone | | |
| Window Setting: 2000 ww/500 wl (Bone) | | |
| | 16-Detector Protocol | 64-Detector Protocol |
| Gantry Rotation Time | 0.8 sec | 0.8 sec |
| Acquisition (detector width x # detector rows = detector | 16 x 0.625 = 10 mm | 32 x 0.625 = 20 mm |

| | | |
|--|--------------------|--------------------|
| coverage) | | |
| Reconstruction (Slice thickness/interval) | 1.25 mm / 0.625 mm | 1.25 mm / 0.625 mm |
| Pitch | 0.562 | 0.531 |
| kVp / mA | 140 / 400 | 140 / 400 |
| Reconstruction 2: | | |
| Algorithm: Standard | | |
| Slice Thickness/Interval: 1.25 mm / 0.625 mm | | |
| Window Setting: 350 ww/50 wl | | |
| MPRs: Bone algorithm | | |
| Slice Thickness/Interval: 2mm / 2mm | | |
| Planes: | | |
| <ol style="list-style-type: none"> 1. Axial (see Fig. 22-9A) 2. Coronal to femur (see Fig. 22-9B) 3. Sagittal to femur (see Fig. 22-9C) | | |

Knee/Tibial Plateau



| | | |
|--|----------------------|----------------------|
| Positioning: Patient supine, legs flat on table; tape feet together | | |
| Scouts: AP and lateral | | |
| Scan Type: Helical | | |
| Start Location: Just above patella | | |
| End Location: Just below fibular head | | |
| DFOV: ~20 cm (adjust to include skin surface; affected knee only) | | |
| SFOV: Large body | | |
| Algorithm: Bone plus | | |
| Window Setting: 2000 ww/500 wl (Bone) | | |
| | 16-Detector Protocol | 64-Detector Protocol |
| Gantry Rotation Time | 0.8 sec | 0.8 sec |
| Acquisition (detector width x # detector rows = detector coverage) | 16 x 0.625 = 10 mm | 32 x 0.625 = 20 mm |

| | | |
|---|--------------------|--------------------|
| Reconstruction (Slice thickness/interval) | 1.25 mm / 0.625 mm | 1.25 mm / 0.625 mm |
| Pitch | 0.562 | 0.531 |
| kVp / mA | 140 / 300 | 140 / 300 |
| Reconstruction 2: | | |
| Algorithm: Standard | | |
| Slice Thickness/Interval: 1.25 mm / 0.625 mm | | |
| Window Setting: 350 ww/50 wl | | |
| MPRs: Bone algorithm | | |
| Slice Thickness/Interval: 2mm / 2mm | | |
| Planes: | | |
| <ol style="list-style-type: none"> 1. Axial (see Fig. 22-10A) 2. Coronal (see Fig. 22-10B) 3. Sagittal (see Fig. 22-10C) | | |

Ankle/Distal Tibia



| | | |
|---|----------------------|----------------------|
| Positioning: Patient supine, legs flat on table. Use foot holder or tape feet together. | | |
| Scouts: AP and lateral | | |
| Scan Type: Helical | | |
| Start Location: Just above tibial plafond (just above ankle joint) | | |
| End Location: Through calcaneus | | |
| DFOV: ~16 cm (adjust to include skin surface) | | |
| SFOV: Large body | | |
| Algorithm: Bone plus | | |
| Window Setting: 2000 ww/500 wl (Bone) | | |
| | 16-Detector Protocol | 64-Detector Protocol |
| Gantry Rotation Time | 0.8 sec | 0.8 sec |
| Acquisition (detector width x # detector rows = detector coverage) | 16 x 0.625 = 10 mm | 32 x 0.625 = 20 mm |

| | | |
|--|-------------------|-------------------|
| Reconstruction (Slice thickness/interval) | 0.625 mm / 0.3 mm | 0.625 mm / 0.3 mm |
| Pitch | 0.562 | 0.531 |
| kVp / mA | 140 / 200 | 140 / 200 |
| Reconstruction 2: | | |
| Algorithm: Standard | | |
| Slice Thickness/Interval: 0.625 mm / 0.3 mm | | |
| Window Setting: 350 ww/50 wl | | |
| MPRs: Bone algorithm | | |
| Slice Thickness/Interval: 2mm / 2mm | | |
| Planes: | | |
| <ol style="list-style-type: none"> 1. Axial (see Fig. 22-6A) 2. Coronal (see Fig. 22-6B) 3. Sagittal (see Fig. 22-6C) | | |