

MSK US Exam Protocol Standardization

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Standardized Diagnostic US Exams:

- Shoulder
- Elbow
- Wrist
- Fingers
- Hip
- Knee
- Ankle
- Foot (Morton's)
- Nerves

Complete exams include

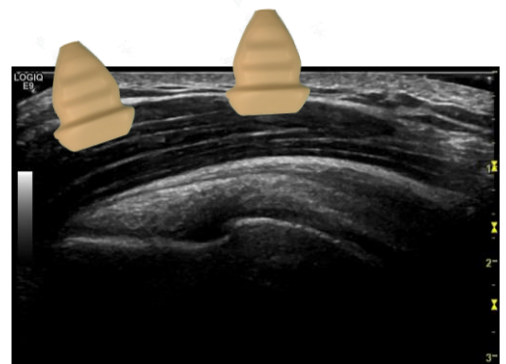
- Long and Short axis views (*unless otherwise indicated per protocol*)
- Power or Color Doppler (PD)
- Extended field of view images as indicated
- Contralateral comparison if abnormal or as indicated per protocol

Charge a limited exam for foreign bodies and superficial lumps or if for some reason you are only looking at one aspect of any of the protocols below...i.e. just biceps tendon. Adjacent joint MUST be imaged to bill a complete exam

UPPER EXTREMITY

➤ Shoulder

- Long head biceps tendon (PD)
 - Dynamic- biceps tendon subluxation*
- Subscapularis tendon (PD)
 - Cine Long: Superior to Inferior
- AC joint (PD) (*Short to body*)
- SST – Modified Crass position (PD)
 - True Long (Image flat greater tuberosity ridge)
 - Cine Long and Short
 - Additional images more medial (*Long*)
- Dynamic – SST/SASD bursa impingement (*Long*)
- Cross-sectional image of SST muscle in fossa w/ contralateral comparison (*Short*)
 - Measurement
- IST – longitudinal with arm crossed over chest (*Long*)
 - If torn, cross-sectional image of SST muscle in fossa w/ contralateral comparison (*Short*)
 - Measurement
- Posterior labrum and posterior shoulder joint (*Long*)
 - Dynamic of posterior shoulder/labrum/shoulder joint*
- Spinoglenoid notch (*Short to body*)



*Dynamic biceps tendon subluxation & posterior labrum: palm supinated, internal and

➤ **Lateral Elbow**

- Common extensor tendon (CET) (PD)
- Radial collateral ligament (RCL)
 - Dynamic-stretching the CET (**Long**)*
- Radiocapitellar joint with dynamic stressing (**Long**)

**Dynamic stretching of CET: Hand off the edge of table or sponge, pronate hand, make a fist, flex and extend at the wrist*

➤ **Medial Elbow**

- Common flexor tendon (PD)
- Ulnar collateral ligament (UCL)
- Ulnar nerve
 - Dynamic – Ulnar nerve (**Short**)*
 - **Contralateral comparison** (**Short**)
- Ulnotrochlear joint with dynamic stressing (**Long**)

**Dynamic Ulnar Nerve: Light pressure on posteromedial elbow, flex and extend at the elbow*

➤ **Anterior Elbow**

- Biceps tendon at insertion onto radial tuberosity (PD)
 - Cine (**Short**)
- Biceps muscle
- **Brachialis tendon and muscle**
- Anterior elbow joint
- Nerves – if applicable

➤ **Posterior Elbow**

- Triceps (PD)
- Posterior elbow joint
- Loose body evaluation
- Ulnar nerve
 - Dynamic- Ulnar nerve (**Short**)*
 - **Contralateral comparison** (**Short**)

**Dynamic Ulnar Nerve: Light pressure on posteromedial elbow, flex and extend at the elbow*

➤ **Wrist Volar (Tendons)**

- Flexor tendons (PD)
- Median Nerve
 - **Measurements- circumferential area** (**Short**)
 - In carpal tunnel (level of scaphoid and pisiform)
- Radiocarpal joint (**Long to body**)

➤ **Wrist Dorsal (Tendons/Compartments)**

- Extensor tendons (*1 or multiple compartments*) (PD)
- Radiocarpal joint (**Long to body**)
- Scapholunate and Lunotriquetral Ligaments (**Short to body**)

➤ **Wrist DeQuarvain's (1st Compartment)**

- Abductor pollicis longus tendon (APL)
 - Prox-Dist (PD)
 - Dynamic
- Extensor pollicis brevis tendon (EPB)
 - Prox-Dist (PD)
 - Dynamic
- Compartments 2-6 (**Short**) (PD)- 1-2 images
- Radiocarpal joint (**Long to body**)

➤ **Wrist Extensor Carpi Ulnaris (ECU) Subluxation**

- ECU Tendon (PD)
- Dynamic wrist ECU snapping/subluxation (**Short**)*
 - Have patient reproduce snapping
- Contralateral comparison w/dynamic (**Short**)
- Distal radioulnar joint (DRUJ) (**Short**)

**Dynamic ECU: Light pressure ECU w/in groove; supination and pronation*

➤ **Wrist Synovitis**

- Volar
 - Radiocarpal Joint (**Long to body**)
 - Distal Radioulnar Joint (**Short to body**)
- Ulnar Styloid (**Long to body**)
- Dorsal
 - Radial Carpal Recesses
 - Trapezium/Scaphoid/Radius (**Long to body**)
 - Capitate/ Lunate/Radius] (**Long to body**)
 - 4th and 6th Dorsal Compartments (**Short**)
- Index and Middle MCP and PIP Joints (**Long**; Volar or Dorsal)
- Power/Color Doppler all joints (Very light pressure on skin)
- Area of pain/swelling (if applicable)

Grading Synovial Hypertrophy

For synovial hypertrophy 0-3:

- 0 = normal
- 1 = synovial hypertrophy to level of metacarpal (fills the angle between bones without bulging over line linking bones)
- 2 = synovial hypertrophy with bulging over the line linking tops of periarticular bones (WITHOUT extension over diaphysis)
- 3 = Extension over diaphysis

PDI (Power Doppler): 0-3

- 0 = normal
- 1 = single vessel
- 2 = <0.5 area of synovium
- 3 = >0.5 area of synovium

➤ **Fingers** – assess at MCP, PIP, DIP joint on finger of interest

- Flexor tendon (PD) or Extensor tendons (PD) (whichever side is indicated)
- Dynamic imaging
- Volar plate (**Long**) (PD)
- Affected joint (PD)
- Comparison with adjacent finger, if necessary

LOWER EXTREMITY

➤ Anterior Hip

- Iliopsoas tendon (PD)
 - Dynamic (**Short**)*
- Iliopsoas bursa
- Anterior hip joint (**Long**)
- Anterior hip labrum (**Long**)

**Dynamic IP: flex and externally rotate hip; extend and internally rotate hip in one motion*

➤ Lateral Hip (Limited Study)

- Gluteus Maximus Tendon (PD)
- Gluteus Medius Tendon (PD)
- Gluteus Minimus Tendon (PD)
- Extended field of view over greater trochanter (**Long**)
- If lateral hip snapping
 - IT Band (**Long**)
 - Dynamic (**Short**)*

**Dynamic IT Band: flex and extend hip or let patient reproduce symptoms*

➤ Posterior Hip (Hamstring) (Limited Study)

- Conjoint tendon & proximal muscles (PD)
- Semimembranosus & proximal muscle (PD)
- Contralateral comparison
 - Measurement of tendons near origin/thickest area
- Sciatic nerve near hamstring tendons/muscles

➤ Anterior Knee

- Quad tendon (PD)
 - Dynamic (**Long**)*
- Patellar tendon (PD)
 - Dynamic (**Long**)*
- Hoffa's fat pad (PD) (**Long**)
- Suprapatellar fat pad/joint (PD) (**Long**)
- Joint effusion in suprapatellar region (PD)
- Medial plica (**Long**)

**Dynamic Quad and Patellar tendon: flex and extend knee*

➤ Medial Knee

- Medial collateral ligament (MCL) (PD)
- Medial compartment joint space
 - Dynamic of meniscus (**Long**)*
- Pes anserine bursa
- Knee joint effusion (PD)

**Dynamic of Meniscus: w/valgus stress*

➤ Lateral Knee

- Iliotibial (IT) band (PD)
- Lateral collateral ligament (LCL)
- Biceps femoris tendon
- Lateral compartment joint space
- Dynamic – (**Long**)*

**Dynamic posterolateral corner joint space: w/varus stress*

➤ **Posterior Knee (Limited Study)**

- Baker's cyst (PD)
 - Measure
 - Demonstrate neck
- Origin of gastrocnemius muscles
- Posterior knee joint effusion (PD)
- Posterior cruciate ligament (PCL) (Long)

➤ **Lateral Ankle**

- Peroneus Longus tendon (PD)
 - Cine (Short)
- Peroneus Brevis tendon (PD)
 - Cine (Short)
- Dynamic (Short)*
- Joint effusion (Long) (PD)
- Anterior talofibular ligament (Long; stress maneuver for tear; PD)
- Anterior Tibiofibular ligament (Long; stress maneuver for tear: PD)
- Calcaneofibular ligament (Long; stress maneuver for tear; PD)

*Dynamic peroneal tendon subluxation:
eversion circumduction

} Eval for
sprains

➤ **Medial Ankle**

- Posterior tibial tendon (PD)
 - Cine (Short)- try to include all 3 but PT most important
- Flexor digitorum longus tendon (PD)
- Flexor hallucis longus tendon (PD)
- Tarsal tunnel/joint (Short)

➤ **Anterior Ankle**

- Anterior tibial tendon (PD)
 - Cine (Short)- demonstrate all 3 tendons
- Ext hallucis longus tendon (PD)
- Ext digitorum longus tendon (PD)
- Ankle joint effusion (Long) (PD)

➤ **Posterior Ankle (Achilles)**

- Achilles tendon (PD)
 - Cine (Short)
- Extended field of View (Long)
- Contralateral comparison (Long)
 - Measure both sides
- Dynamic Achilles (Long) *
- Retrocalcaneal bursa (PD) (Long)
- Posterior ankle joint (Long)
- Plantar fascia (Long)

*Dynamic Achilles: dorsiflexion

- **Foot (Plantar Fascia)**
 - Plantar fascia (PD)
 - Extended field of View (**Long**)
 - Contralateral comparison (**Long**)
 - Measure both sides
 - Achilles tendon/retrocalcaneal bursa (**Long**)
 - Posterior ankle joint (**Long**)
- **Foot (Morton's) (Long)**
 - MTP joints
 - Plantar plate with dynamic dorsiflexion cine 2, 3 and 4 (PD if abnormal)
 - Flexor tendons
 - Interspaces with compression
 - Split screen if abnormal
 - Measure neuroma
 - If neuroma, Mulder's test (**Short**)

NERVES

- **Median Nerve**
 - Median nerve (PD)
 - **Measurements- circumferential area (Short)**
 - In carpal tunnel (level of scaphoid and pisiform)
 - Over pronator quadratus
 - Contralateral comparison in carpal tunnel or same location as largest measurement
 - Radiocarpal joint (**Long to body**)

- **Ulnar Nerve (Elbow)**
 - Ulnar nerve (PD)
 - Measurements- AP thickest portion in cubital tunnel (**Short**)
 - Contralateral comparison in same location
 - Dynamic for subluxation/dislocation
 - Have patient reproduce symptoms
 - Ulnocubital joint (**Long**)

**Image through cubital tunnel (b/w medial epicondyle and olecranon)*

*** Dynamic Ulnar Nerve: Light pressure on posteromedial elbow, flex and extend at the elbow*

- **Ulnar Nerve (Wrist/Guyon's Canal)**
 - Ulnar nerve (PD)
 - Measurements- AP thickest portion w/in canal (**Short**)
 - Contralateral comparison in same location
 - Pisotriquetral joint (**Short to body**)

**Image proximal to distal volar wrist through Guyon's canal*

- **Common Peroneal Nerve (Posterolateral knee/fibula)**
 - Common peroneal nerve (PD)
 - Location
 - From branch off the sciatic nerve, distally around fibular head to bifurcation
 - Follow superficial and deep branches (**Short**)
 - Measurement (**Short**)
 - Contralateral comparison
 - Cine (**Short**)
 - From sciatic to bifurcation
 - Anterior compartment muscles (PD)
 - Atrophy and echogenicity changes due to denervation changes
 - Proximal tibiofibular joint (**Short to body**)

- **Other Nerve Mapping (*Limited study*)**
 - Radiologist discretion per exam
 - Bump/Neuroma bill as limited diagnostic

NOTE: Guidelines for performing diagnostic exams on injection patients

➤ Iliopsoas Bursa

Diagnostic w/Injection	Injection only
<ul style="list-style-type: none"> • No prior diagnostic ultrasound w/in 2 years • New injury • Recent surgery 	<ul style="list-style-type: none"> • Prior diagnostic ultrasound w/in 2 years • No new injury • No recent surgery • Hip Joint injections do not need a diagnostic – Injection only

➤ Gluteal Tendons

Diagnostic limited w/Injection	Injection only
<ul style="list-style-type: none"> • No prior diagnostic ultrasound or MRI w/in 2 years • New injury • Recent surgery 	<ul style="list-style-type: none"> • Prior diagnostic ultrasound or MRI w/in 2 years • No new injury • No recent surgery • Hip Joint injections do not need a diagnostic – Injection only

➤ Shoulder

Diagnostic w/Injection	Injection only
<ul style="list-style-type: none"> • No prior diagnostic ultrasound or MRI w/in 2 years • New injury • Recent surgery 	<ul style="list-style-type: none"> • Prior diagnostic ultrasound or MRI w/in 2 years • No new injury • No recent surgery • Glenohumeral/ AC/Hip Joint injections do not need a diagnostic – Injection only

➤ Calcific Lavage

- Image affected tendon (long/short/cine/PD) only to evaluate for tear and measure calcium unless full diagnostic indicated
- Bill Calcific Lavage (R76924AY) and add Limited Extremity (Group for Power Scribe)

➤ Limited vs complete

- Limited studies are lump/bump/ganglion cyst checks that do not turn into detailed study OR protocols that don't include adjacent joint

****All protocols subject to changes by staff radiologist on case by case basis****