

Clinical Appropriateness Guidelines: Advanced Imaging

Appropriate Use Criteria: Imaging of the Extremities

Effective Date: March 12, 2018

Proprietary

Date of Origin: 03/30/2005

Last revised: 07/26/2016

Last reviewed: 09/22/2017



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Description and Application of the Guidelines



AIM's Clinical Appropriateness Guidelines (hereinafter "AIM's Clinical Appropriateness Guidelines" or the "Guidelines") are designed to assist providers in making the most appropriate treatment decision for a specific clinical condition for an individual. As used by AIM, the Guidelines establish objective and evidence-based, where possible, criteria for medical necessity determinations. In the process, multiple functions are accomplished:

- To establish criteria for when services are medically necessary
- To assist the practitioner as an educational tool
- To encourage standardization of medical practice patterns
- To curtail the performance of inappropriate and/or duplicate services
- To advocate for patient safety concerns
- To enhance the quality of healthcare
- To promote the most efficient and cost-effective use of services

AIM's guideline development process complies with applicable accreditation standards, including the requirement that the Guidelines be developed with involvement from appropriate providers with current clinical expertise relevant to the Guidelines under review and be based on the most up to date clinical principles and best practices. Relevant citations are included in the "References" section attached to each Guideline. AIM reviews all of its Guidelines at least annually.

AIM makes its Guidelines publicly available on its website twenty-four hours a day, seven days a week. Copies of AIM's Clinical Appropriateness Guidelines are also available upon oral or written request. Although the Guidelines are publicly-available, AIM considers the Guidelines to be important, proprietary information of AIM, which cannot be sold, assigned, leased, licensed, reproduced or distributed without the written consent of AIM.

AIM applies objective and evidence-based criteria and takes individual circumstances and the local delivery system into account when determining the medical appropriateness of health care services. The AIM Guidelines are just guidelines for the provision of specialty health services. These criteria are designed to guide both providers and reviewers to the most appropriate services based on a patient's unique circumstances. In all cases, clinical judgment consistent with the standards of good medical practice should be used when applying the Guidelines. Guideline determinations are made based on the information provided at the time of the request. It is expected that medical necessity decisions may change as new information is provided or based on unique aspects of the patient's condition. The treating clinician has final authority and responsibility for treatment decisions regarding the care of the patient and for justifying and demonstrating the existence of medical necessity for the requested service. The Guidelines are not a substitute for the experience and judgment of a physician or other health care professionals. Any clinician seeking to apply or consult the Guidelines is expected to use independent medical judgment in the context of individual clinical circumstances to determine any patient's care or treatment.

The Guidelines do not address coverage, benefit or other plan specific issues. If requested by a health plan, AIM will review requests based on health plan medical policy/guidelines in lieu of AIM's Guidelines.

The Guidelines may also be used by the health plan or by AIM for purposes of provider education, or to review the medical necessity of services by any provider who has been notified of the need for medical necessity review, due to billing practices or claims that are not consistent with other providers in terms of frequency or some other manner.

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Administrative Guideline: Ordering of Multiple Studies



Requests for multiple imaging studies to evaluate a suspected or identified condition and requests for repeated imaging of the same anatomic area are subject to additional review to avoid unnecessary or inappropriate imaging.

Simultaneous Ordering of Multiple Studies

In many situations, ordering multiple imaging studies at the same time is not clinically appropriate because:

- Current literature and/or standards of medical practice support that one of the requested imaging studies is more appropriate in the clinical situation presented; or
- One of the imaging studies requested is more likely to improve patient outcomes based on current literature and/or standards of medical practice; or
- Appropriateness of additional imaging is dependent on the results of the lead study.

When multiple imaging studies are ordered, the request will often require a peer-to-peer conversation to understand the individual circumstances that support the medical necessity of performing all imaging studies simultaneously.

Examples of multiple imaging studies that may require a peer-to-peer conversation include:

- CT brain and CT sinus for headache
- MRI brain and MRA brain for headache
- MRI cervical spine and MRI shoulder for pain indications
- MRI lumbar spine and MRI hip for pain indications
- MRI or CT of multiple spine levels for pain or radicular indications
- MRI foot and MRI ankle for pain indications
- Bilateral exams, particularly comparison studies

There are certain clinical scenarios where simultaneous ordering of multiple imaging studies is consistent with current literature and/or standards of medical practice. These include:

- Oncologic imaging – Considerations include the type of malignancy and the point along the care continuum at which imaging is requested
- Conditions which span multiple anatomic regions – Examples include certain gastrointestinal indications or congenital spinal anomalies

Repeated Imaging

In general, repeated imaging of the same anatomic area should be limited to evaluation following an intervention, or when there is a change in clinical status such that imaging is required to determine next steps in management. At times, repeated imaging done with different techniques or contrast regimens may be necessary to clarify a finding seen on the original study.

Repeated imaging of the same anatomic area (with same or similar technology) may be subject to additional review in the following scenarios:

- Repeated imaging at the same facility due to motion artifact or other technical issues
- Repeated imaging requested at a different facility due to provider preference or quality concerns
- Repeated imaging of the same anatomic area (MRI or CT) based on persistent symptoms with no clinical change, treatment, or intervention since the previous study
- Repeated imaging of the same anatomical area by different providers for the same member over a short period of time

Administrative Guideline: Pre-Test Requirements



Critical to any finding of clinical appropriateness under the guidelines for specific imaging exams is a determination that the following are true with respect to the imaging request:

- A clinical evaluation has been performed prior to the imaging request (which should include a complete history and physical exam and review of results from relevant laboratory studies, prior imaging and supplementary testing) to identify suspected or established diseases or conditions.
- **For suspected diseases or conditions:**
 - Based on the clinical evaluation, there is a reasonable likelihood of disease prior to imaging; and
 - Current literature and standards of medical practice support that the requested imaging study is the most appropriate method of narrowing the differential diagnosis generated through the clinical evaluation and can be reasonably expected to lead to a change in management of the patient; and
 - The imaging requested is reasonably expected to improve patient outcomes based on current literature and standards of medical practice.
- **For established diseases or conditions:**
 - Advanced imaging is needed to determine whether the extent or nature of the disease or condition has changed; and
 - Current literature and standards of medical practice support that the requested imaging study is the most appropriate method of determining this and can be reasonably expected to lead to a change in management of the patient; and
 - The imaging requested is reasonably expected to improve patient outcomes based on current literature and standards of medical practice.
- If these elements are not established with respect to a given request, the determination of appropriateness will most likely require a peer-to-peer conversation to understand the individual and unique facts that would supersede the pre-test requirements set forth above. During the peer-to-peer conversation, factors such as patient acuity and setting of service may also be taken into account.

Computed Tomography (CT) Upper Extremity



CPT Codes

- 73200..... CT upper extremity, without contrast
- 73201..... CT upper extremity, with contrast
- 73202..... CT upper extremity, without contrast, followed by re-imaging with contrast

Standard Anatomic Coverage

- Scan coverage depends on the specific clinical indication for the exam and varies considerably, based on anatomic considerations (from shoulder through fingers) and clinical manifestations
- Depending on the protocol used, the CT data acquisition(s) may allow for diagnostic multi-planar reconstructions through the region of interest

Imaging Considerations

- Conventional radiographs should be obtained before advanced imaging
- CT is often the preferred modality for evaluation of displaced fractures and subluxations, whereas stress fractures and some incomplete and non-displaced fractures may be better imaged with MRI or radionuclide bone scintigraphy
- If radiographic findings are typical of osteomyelitis, advanced imaging may not be necessary
- In osteomyelitis, CT may be helpful in defining bone sequestra
- For evaluation of musculoskeletal tumors, MRI is generally preferred over CT, unless there is a contraindication to performance of an MRI exam
- Use of contrast (intravenous or intra-articular for CT arthrogram) is at the discretion of both the ordering and imaging physicians
- Brachial plexus imaging: MRI, when not contraindicated, is the preferred imaging modality for brachial plexus. The brachial plexus is a network of nerves in the neck, passing under the clavicle and into the axilla. Assign either a CT or MRI of the upper extremity for imaging the brachial plexus

Common Diagnostic Indications

Abnormalities detected on other imaging studies which require additional clarification to direct treatment

Chronic shoulder pain

- In a patient where focused history and physical exam suggest non-specific upper extremity pain, rotator cuff tendinopathy, adhesive capsulitis or subacromial impingement syndrome; **AND**
- Following non-diagnostic conventional radiographs; **AND**
- Patient has completed a minimum of six (6) consecutive weeks of physician supervised conservative treatment for the current episode of pain, including but not limited to:
 - Physical therapy (home exercise only if physical therapy is not available); **AND**
- After trial of conservative treatment as listed above, patient fails to show substantial improvement on clinical reevaluation

CT accompanying an arthrogram (CT arthrography)

Fracture evaluation

- To confirm a suspected (occult) fracture following initial radiographs; **OR**
- To define the extent of an acute fracture and position of fracture fragments; **OR**
- To assess fracture healing for delayed union or non-union

Common Diagnostic Indications

Hemarthrosis (bloody joint effusion)

- Documented by arthrocentesis except in cases when arthrocentesis is contraindicated (e.g. non-traumatic causes of hemarthrosis such as sickle cell, anticoagulant, or hemophilia)

Infectious process

- In a patient where focused history and physical exam suggest an underlying soft tissue infection when:
 - Patient is unresponsive to treatment including but not limited to antibiotics or incision/drainage
- Abscess - to determine the location and extent for surgical treatment
- Osteomyelitis – following non-diagnostic radiographs and when MRI is contraindicated
- Fasciitis

Intra-articular loose body, including synovial osteochondromatosis

Neuropathic osteodystrophy (Charcot joint)

- Following conventional radiographs, when there is need for additional diagnostic information from a CT exam to direct treatment decisions (such as concern for an underlying infectious process)

Osteonecrosis [avascular necrosis (AVN); aseptic necrosis]

- Requires initial plain films, prior to advanced imaging
- MRI is often the preferred imaging modality, particularly for evaluation in the early stages of osteonecrosis
- Common anatomic locations for osteonecrosis in the upper extremity are:
 - Humeral head
 - Radial head
 - Carpal navicular bone
 - Lunate bone (lunate osteonecrosis also referred to as Kienbock's disease)

Post-operative or post-procedure evaluation

Pre-operative or pre-procedure evaluation

Note: *This indication is to be used for pre-operative evaluation of conditions not specifically referenced elsewhere in this guideline*

Pre-operative evaluation of anterior glenohumeral instability

- Radiography insufficient for presurgical planning; **AND**
- Recurrent anterior shoulder dislocation; **OR**
- First time dislocation
 - Young and at high risk for recurrence¹⁻²

Septic arthritis - when MRI is contraindicated

- When any of the following risk factors are present:
 - Underlying joint disease
 - Joint prosthesis
 - IV drug abuse
 - Diabetes
 - Presence of cutaneous ulcers; **OR**
- Pre-operative planning

Significant trauma

- Usually preceded by initial plain film radiographs

Common Diagnostic Indications

Soft tissue mass

(any **one** of the following)

- Soft-tissue evaluation when prominent calcifications are seen on radiograph;
- Spontaneous soft tissue hemorrhage with or without palpable mass
- Surveillance, without pathologic tissue confirmation, of an unexplained mass identified on prior imaging
- Following a non-diagnostic radiograph to evaluate a palpable mass found on physical exam

Note: MRI is typically preferred in the evaluation of soft tissue masses

Tumor evaluation: primary neoplasm or metastatic disease

(any **one** of the following)

- Biopsy-proven malignancy
- Surveillance, without pathologic tissue confirmation, of an unexplained mass identified on prior imaging

When the patient's condition meets the upper extremity MRI guidelines, but there is either a contraindication to MRI or the patient cannot tolerate MRI examination (for example, due to claustrophobia)

References

1. Bencardino JT, Gyftopoulos S, Palmer WE. Imaging in anterior glenohumeral instability. *Radiology*. 2013;269(2):323-337.
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Magnetic Resonance Imaging (MRI) Upper Extremity (Any Joint)



CPT Codes

- 73221..... MRI upper extremity, any joint, without contrast
- 73222..... MRI upper extremity, any joint, with contrast
- 73223..... MRI upper extremity, any joint, without contrast, followed by re-imaging with contrast

Standard Anatomic Coverage

- Scan coverage depends on the specific clinical indication for the exam and varies considerably, based on anatomic (from shoulder joint through hand/digits) and clinical considerations
- MRI routinely provides multi-planar imaging through the region of interest

Imaging Considerations

- Conventional radiographs should be obtained before advanced imaging
- Use of contrast (intravenous or intra-articular) is at the discretion of both the ordering and imaging physicians
- CT is often the preferred modality for evaluation of displaced fractures and subluxations, whereas stress fractures and some incomplete and non-displaced fractures may be better imaged with MRI or radionuclide bone scintigraphy
- MRI is used more often to evaluate internal derangements of the joints and related tendinous, ligamentous and cartilaginous structures
- MRI is also useful for evaluation of possible osteomyelitis, despite negative or non-diagnostic plain films and/or triple-phase bone scintigraphy. One exception for osteomyelitis is detection of bone sequestra, which may be better depicted with CT
- If radiographic findings are typical of osteomyelitis, advanced imaging may not be necessary
- For evaluation of musculoskeletal tumors, MRI is generally preferred over CT, unless there is a contraindication to performance of an MRI exam
- For suspected osteonecrosis, MRI is often more sensitive than CT and bone scintigraphy
- Implanted surgical hardware, including joint prostheses, may produce sufficient local artifact to preclude adequate imaging through the region containing hardware

Common Diagnostic Indications

This section contains general upper extremity, shoulder, elbow, and wrist and hand joint indications.

General Upper Extremity

Abnormalities detected on other imaging studies which require additional clarification to direct treatment

EMG-proven entrapment neuropathy after conservative therapy to direct treatment

- Suspected entrapment neuropathy, cubital tunnel detail, and/or carpal tunnel are not considered medically necessary

Fracture evaluation¹²

(Any one of the following)

- To confirm a suspected occult/stress fracture following non-diagnostic initial radiographs at high risk sites:
 - Scaphoid
 - Lunate
- To define the extent of an acute fracture when surgery is being considered
- To assess fracture healing for delayed union or non-union, when repeat radiographs are non-diagnostic

Common Diagnostic Indications

Hemarthrosis (bloody joint effusion)

- Documented by arthrocentesis except in cases when arthrocentesis is contraindicated (e.g. non-traumatic causes of hemarthrosis such as sickle cell, anticoagulant, or hemophilia)

Infectious process

- In a patient where focused history and physical exam suggest a underlying soft tissue infection when:
 - Patient is unresponsive to treatment including but not limited to antibiotics or incision/drainage
- Abscess – to determine the location and extent for surgical treatment
- Osteomyelitis – following non-diagnostic radiographs
- Fasciitis

Intraarticular loose body

- Following non-diagnostic radiographs

Note: Includes synovial osteochondromatosis

Ligament and tendon injuries

- In a patient following a focused history and physical exam; **AND**
- After a trial of conservative treatment (that may include physical therapy, for the current episode of pain); **AND**
- Patient fails to show substantial improvement on clinical reevaluation

MRI accompanying an arthrogram (MR arthrography)

Neuropathic osteodystrophy (Charcot joint)

- Following conventional radiographs, when there is need for additional diagnostic information from an MRI exam to direct treatment decisions (such as concern for an underlying infectious process)

Non-specific upper extremity pain

- In a patient where focused history and physical exam suggest non-specific upper extremity pain; **AND**
- Following normal or non-diagnostic conventional radiographs; **AND**
- Atraumatic; **AND**
- At least one of the following:
 - Significant weakness; **OR**
 - No improvement following clinical re-evaluation after a minimum of six (6) consecutive weeks of physician supervised conservative treatment for the current episode of pain, including but not limited to:
 - NSAIDs or steroids (oral or injection) – unless contraindicated
 - Physical therapy (home exercise only if physical therapy is not available)

Note: For suspicion of specific etiology, especially red flag conditions such as tumor, infection and acute trauma, please refer to the corresponding indication

Osteochondral lesion

Osteonecrosis [avascular necrosis (AVN); aseptic necrosis]

- Requires initial plain films, prior to advanced imaging
- Common anatomic locations for osteonecrosis in the upper extremity are:
 - Humeral head
 - Radial head
 - Carpal navicular bone
 - Lunate bone (lunate osteonecrosis also referred to as Kienbock's disease)

Pigmented Villonodular synovitis (PVNS)

Common Diagnostic Indications

Post-operative or post-procedure evaluation

Pre-operative or pre-procedure evaluation

Note: This indication is to be used for pre-operative evaluation of conditions not specifically referenced elsewhere in this guideline

Septic arthritis

- When any of the following risk factors are present:
 - Underlying joint disease
 - Joint prosthesis
 - IV drug abuse
 - Diabetes
 - Presence of cutaneous ulcers; **OR**
- Pre-operative planning

Significant trauma

- Usually preceded by initial plain film radiographs

Soft tissue mass

(any **one** of the following)

- Soft-tissue evaluation when prominent calcifications are seen on radiograph
- Spontaneous soft tissue hemorrhage with or without palpable mass
- Surveillance, without pathologic tissue confirmation, of an unexplained mass identified on prior imaging
- Following a non-diagnostic radiograph to evaluate a palpable mass found on physical exam

Tumor evaluation: primary neoplasm or metastatic disease

(any **one** of the following)

- Biopsy-proven malignancy
- Surveillance, without pathologic tissue confirmation, of an unexplained mass identified on prior imaging

Shoulder Joint Imaging

Anterior glenohumeral instability/labral tear

Diagnosis of anterior glenohumeral instability/anterior labral tear

- Recurrent anterior shoulder dislocation² OR
- First time dislocation
 - Young and at high risk for recurrence³

Acute shoulder pain

- Following non-diagnostic conventional radiographs; **AND**
- In a patient who is a candidate for corticosteroid or anesthetic injection and one of the following:
 - Suspected bursitis; **OR**
 - Suspected long head of biceps tenosynovitis

Chronic shoulder pain

- In a patient where focused history and physical exam suggest non-specific upper extremity pain, adhesive capsulitis or subacromial impingement syndrome; **AND**
- Following non-diagnostic conventional radiographs; **AND**
- Patient has completed a minimum of six (6) consecutive weeks of physician supervised conservative treatment for the current episode of pain, including but not limited to:
 - Physical therapy (home exercise only if physical therapy is not available); **AND**
- After trial of conservative treatment as listed above, patient fails to show substantial improvement on clinical re-evaluation

Common Diagnostic Indications

Rotator Cuff Tear

Diagnosis of acute rotator cuff tear

(All of the following)

- Following non-diagnostic radiographs and/or ultrasound
- At least one (1) positive sign to support the diagnosis of rotator cuff tear (see **Table 1**)
- No improvement after an initial trial of conservative therapy, including 4 weeks of physical therapy, unless the patient is at high risk for an acute full thickness rotator cuff tear (see **Table 2**)

Diagnosis of chronic rotator cuff tear

(All of the following)

- At least one (1) positive sign to support the diagnosis of rotator cuff tear (see **Table 1**)
- Following non-diagnostic radiograph and/or ultrasound
- Symptoms have persisted for more than 3 months despite optimal medical management

Management of rotator cuff tear

- Post-operative ⁵
 - Suspicion of recurrent rotator cuff tear
 - Post-surgical complication

Note: For patients who have not had surgery when there is a concern for recurrent rotator cuff tear, see the diagnosis of rotator cuff tear guideline. Ultrasound, radiographs, or CT arthrography are generally preferred in the evaluation of recurrent rotator cuff tear after total shoulder arthroplasty

Table 1: Findings suggestive of a rotator cuff tear include but are not limited to the following: ¹²

Positive (elicits weakness and/or pain) for at least one of the following:		
<ul style="list-style-type: none"> • Apley scratch test • Apprehension • Belly press/belly off • Cross body • Drop arm/sign • Empty can / Full can 	<ul style="list-style-type: none"> • External rotation lag sign • Hawkins-Kennedy • Hornblower • Infraspinatus muscle strength test • Jobe's test 	<ul style="list-style-type: none"> • Lift off • Neer • Painful arc • Patte • Resisted abduction

Table 2: High risk patients have at least one of the following symptoms to suggest either an acute full thickness rotator cuff tear or an alternative etiology for acute shoulder pain

<ul style="list-style-type: none"> • Acute traumatic event 	<ul style="list-style-type: none"> • Decreased pulse
<ul style="list-style-type: none"> • Positive drop arm 	<ul style="list-style-type: none"> • Plateau in therapy response
<ul style="list-style-type: none"> • Profound loss of strength 	<ul style="list-style-type: none"> • Worsening of symptoms during therapy
<ul style="list-style-type: none"> • Loss of sensation 	<ul style="list-style-type: none"> • At least two signs of a SLAP tear

Common Diagnostic Indications

Superior Labrum Anterior Posterior (SLAP) tears

Diagnosis of SLAP tears

- Clinical findings of a SLAP tear (see Table 3) and one of the following:
 - Symptoms do not improve or worsen after 4 weeks of conservative therapy
 - High risk patient defined as (see Table 4)

Management of Labral tears

- Pre-operative-
 - Labral tear established by a modality other than MRI; **OR**
 - More than 1 year between MRI and surgical evaluation
- Post-operative
 - No clinical improvement; **AND**
 - At least three months after surgery

Table 3: Clinical findings of a SLAP tear may include but are not limited to the following: ⁶⁻⁸

Pain exacerbated by overhead activity or heavy lifting
Popping or locking of the shoulder
Signs of shoulder instability: <ul style="list-style-type: none">• Speed's biceps tendon test• O'Brien's test• Compression-Rotation test• Yergason's test

Table 4: Patients at High Risk for SLAP tears:

<ul style="list-style-type: none">• Acute trauma; AND• Under 45 years of age; OR• Evidence of suprascapular nerve entrapment including but not limited to<ul style="list-style-type: none">○ Posterolateral shoulder pain; OR○ Supraspinatus and/or infraspinatus weakness; OR○ Supraspinatus and/or infraspinatus atrophy
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Suspected occult shoulder fracture

- With high clinical suspicion and negative or inconclusive shoulder radiographs

Elbow Imaging

Biceps tendon rupture

- At insertion onto radial tuberosity

Capitellar osteochondritis

Epicondylitis

- In a patient following a focused history and physical exam; **AND**
- Following non-diagnostic conventional radiographs; **AND**
- After a trial of conservative treatment (that may include physical therapy for strengthening); **AND**
- Patient fails to show substantial improvement on clinical re-evaluation

Note: *Epicondylitis is generally considered a clinical diagnosis and imaging usually does not change management. Specialist evaluation should be strongly considered prior to advanced imaging*

Ulnar collateral ligament tear

Common Diagnostic Indications

Suspected occult elbow fracture

- With high clinical suspicion and negative or inconclusive elbow radiographs

Triceps tendon rupture

- From olecranon insertion site

Additional Indications for Wrist and Hand Imaging

Scaphoid fracture

Triangular fibrocartilage complex (TFCC) tear

Ulnar collateral ligament tear (gamekeeper's thumb)

MRI is not indicated in the following clinical situations

The indications listed in this section do not require advanced imaging using MRI. If there are circumstances that require MRI imaging, a peer-to-peer discussion may be required.

Subacromial impingement⁹⁻¹¹

Note: *Imaging is not indicated unless there is concern for a rotator cuff tear*

References

1. Lakkaraju A, Sinha R, Garikipati R, Edward S, Robinson P. Ultrasound for initial evaluation and triage of clinically suspicious soft-tissue masses. *Clin Radiol*. 2009 Jun;64(6):615-621.
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Magnetic Resonance Imaging (MRI) Upper Extremity (Non-Joint)



CPT Codes

- 73218..... MRI upper extremity, non-joint, without contrast
- 73219..... MRI upper extremity, non-joint, with contrast
- 73220..... MRI upper extremity, non-joint, without contrast, followed by re-imaging with contrast

Standard Anatomic Coverage

- Scan coverage depends on the specific clinical indication for the exam and varies considerably, based on anatomic (from shoulder joint through hand/digits) and clinical considerations
- MRI routinely provides multi-planar imaging through the region of interest

Imaging Considerations

- Conventional radiographs should be obtained before advanced imaging
- CT is often the preferred modality for evaluation of displaced fractures and subluxations, whereas stress fractures and some incomplete or non-displaced fractures may be better imaged with MRI or radionuclide bone scintigraphy
- MRI is often the preferred modality for evaluation of soft tissue abnormalities and for interrogation of possible osteomyelitis, despite negative or non-diagnostic plain films and/or triple-phase bone scintigraphy. One exception for osteomyelitis is detection of bone sequestra, which may be better depicted with CT
- If radiographic findings are typical of osteomyelitis, advanced diagnostic imaging may not be necessary
- Use of contrast is at the discretion of both the ordering and imaging physicians
- Brachial Plexus Imaging: MRI, when not contraindicated is the preferred imaging modality for brachial plexus. The brachial plexus is a network of nerves in the neck, passing under the clavicle and into the axilla. Assign either a CT or MRI of the upper extremity (non-joint) for imaging the brachial plexus

Common Diagnostic Indications

Abnormalities detected on other imaging studies which require additional clarification to direct treatment

Brachial plexopathy

Brachial plexus mass

EMG-proven entrapment neuropathy after conservative therapy to direct treatment

- Suspected entrapment neuropathy, cubital tunnel detail, and/or carpal tunnel are not considered medically necessary

Fracture evaluation

(Any one of the following)

- To confirm a suspected occult/stress fracture following non-diagnostic initial radiographs at high risk sites:
 - Scaphoid
 - Lunate
- To define the extent of an acute fracture when surgery is being considered
- To assess fracture healing for delayed union or non-union, when repeat radiographs are non-diagnostic

Common Diagnostic Indications

Infectious process

- In a patient where focused history and physical exam suggest an underlying soft tissue infection when:
 - Patient is unresponsive to treatment including but not limited to antibiotics or incision/drainage
- Abscess - to determine the location and extent for surgical treatment
- Osteomyelitis – following non-diagnostic radiographs
- Fasciitis

Myositis

- To determine optimal location for biopsy; **OR**
- To monitor treatment response

Persistent upper extremity pain – unresponsive to six (6) weeks of conservative treatment

- In a patient where focused history and physical exam suggest non-specific upper extremity pain; **AND**
- Following non-diagnostic conventional radiographs; **AND**
- Patient has completed a minimum of six (6) consecutive weeks of physician supervised conservative treatment for the current episode of pain, including but not limited to:
 - NSAIDs or steroids (oral or injection) – unless contraindicated; **OR**
 - Physical therapy (home exercise only if physical therapy is not available); **AND**
- After trial of conservative treatment as listed above, patient fails to show substantial improvement on clinical re-evaluation

Note: For suspicion of specific etiology, please refer to corresponding indication

Post-operative or post-procedure evaluation

Pre-operative or pre-procedure evaluation

Note: This indication is to be used for pre-operative evaluation of conditions not specifically referenced elsewhere in this guideline.

Septic arthritis

- When there is a clinical consideration of contiguous spread of infection into the adjacent soft-tissues of the joint, which would not normally be included on an MRI joint exam; **AND**
- For cases of known septic arthritis, MRI may be used when any of the following risk factors are present:
 - Underlying joint disease
 - Joint prosthesis
 - IV drug abuse
 - Diabetes
 - Presence of cutaneous ulcers; **OR**
- Pre-operative planning

Significant trauma

- Usually preceded by initial plain film radiographs

Soft tissue mass

(any **one** of the following)

- Soft-tissue evaluation when prominent calcifications are seen on radiograph
- Spontaneous soft tissue hemorrhage with or without palpable mass
- Surveillance, without pathologic tissue confirmation, of an unexplained mass identified on prior imaging
- Following a non-diagnostic radiograph to evaluate a palpable mass found on physical exam

Common Diagnostic Indications

Tumor evaluation: primary neoplasm or metastatic disease

(any one of the following)

- Biopsy-proven malignancy
- Surveillance, without pathologic tissue confirmation, of an unexplained mass identified on prior imaging

Ulnar collateral ligament tear (gamekeeper's thumb)

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CPT Codes

- 73206..... Computed tomographic angiography, upper extremity, with contrast material(s), including non-contrast images, if performed, and image post-processing
- 73225..... Magnetic resonance angiography, upper extremity, without and with contrast

Standard Anatomic Coverage

- Depends on the specific anatomic area of interest, from the axillary region through the hand and digits

Imaging Considerations

- CT and MR angiographic techniques include arterial and/or venous assessment, depending on the clinical indication
- Other generally available non-invasive arterial studies of the upper extremity circulation should be considered prior to advanced diagnostic imaging with CTA or MRA. These include segmental systolic pressure measurements, plethysmographic analysis, continuous wave Doppler and/or duplex ultrasonography
- CT angiography utilizes the data obtained from standard CT imaging. A request for a CT exam in addition to a CT Angiography of the same anatomic area during the same imaging session is inappropriate
- For MR arthrography of the upper extremity, see CPT codes 73221-73223
- For imaging the brachial plexus, see CT upper extremity or MRI upper extremity, non-joint

Common Diagnostic Indications

Aneurysm / dilation

Arterial entrapment syndrome

Arterio-venous malformation (AVM) or fistula (AVF)

Dialysis graft evaluation

- Following duplex Doppler assessment
-

Dissection

Intramural hematoma

Post-operative or post-procedure evaluation

Preoperative or pre-procedure evaluation

Note: This indication is for preoperative evaluation of conditions not specifically referenced elsewhere in this guideline.

Raynaud's syndrome

Steno-occlusive disease

- Usually atherosclerotic in origin
-

Thromboembolic disease – arterial or venous

Vascular invasion or compression by a musculoskeletal neoplasm

Vasculitis

Computed Tomography (CT)

Lower Extremity



CPT Codes

- 73700..... CT lower extremity without contrast
- 73701..... CT lower extremity with contrast
- 73702..... CT lower extremity without contrast, followed by re-imaging with contrast

Standard Anatomic Coverage

- Scan coverage depends on the anatomic area of concern and varies considerably, based on anatomic (from hip through toes) and clinical considerations
- Depending on the protocol used, the CT data acquisition(s) may allow for diagnostic multi-planar reconstructions through the region of interest

Imaging Considerations

- Conventional radiographs should be obtained before advanced imaging
- CT is often the preferred modality for evaluation of displaced fractures and subluxations, whereas stress fractures and some incomplete and non-displaced fractures may be better imaged with MRI or radionuclide bone scintigraphy
- If radiographic findings are typical of osteomyelitis, advanced imaging may not be necessary
- In osteomyelitis, CT may be helpful in defining bony sequestra
- Use of contrast (intravenous and intra-articular) is at the discretion of both the ordering and imaging physicians

Common Diagnostic Indications

Abnormalities detected on other imaging studies which require additional clarification to direct treatment

CT accompanying an arthrogram (CT arthrography)

Fracture evaluation

- To confirm a suspected (occult) fracture following initial radiographs; **OR**
- To define the extent of an acute fracture and position of fracture fragments; **OR**
- To assess fracture healing for delayed union or non-union

Hemarthrosis (bloody joint effusion)

- Documented by arthrocentesis except in cases when arthrocentesis is contraindicated (e.g. non-traumatic causes of hemarthrosis such as sickle cell, anticoagulant, or hemophilia)

Infectious process

- In a patient where focused history and physical exam suggest an underlying soft tissue infection when:
 - Patient is unresponsive to treatment including but not limited to antibiotics or incision/drainage
- Abscess – to determine the location and extent for surgical treatment
- Osteomyelitis – following non-diagnostic radiographs and when MRI is contraindicated
- Fasciitis

Neuropathic osteodystrophy (Charcot joint)

- Following conventional radiographs, when there is need for additional diagnostic information from a CT exam to direct treatment decisions (such as concern for an underlying infectious process)

Common Diagnostic Indications

Osteonecrosis [avascular necrosis (AVN); aseptic necrosis]

- Requires initial plain films, prior to advanced imaging
- MRI is often the preferred imaging modality, particularly for evaluation during the early stages of osteonecrosis

Persistent lower extremity pain (excluding knee joint)

- In a patient where focused history and physical exam suggest non-specific lower extremity pain; **AND**
- Following non-diagnostic conventional radiographs; **AND**
- After a trial of conservative treatment (that may include physical therapy, NSAIDs, steroids unless contraindicated, for this current episode of pain); **AND**
- Patient fails to show substantial improvement on clinical re-evaluation

Note: For suspicion of specific etiology, please refer to corresponding indication

Post-operative or post-procedure evaluation

Note: For post-operative evaluation of conditions not specifically referenced elsewhere in this guideline.

Preoperative or pre-procedure evaluation

Note: This indication is for preoperative evaluation of conditions not specifically referenced elsewhere in this guideline.

Exclusion: This indication does not apply to preoperative evaluation for primary total knee arthroplasty for osteoarthritis.

Septic arthritis - when MRI is contraindicated

- When any of the following risk factors are present:
 - Underlying joint disease
 - Joint prosthesis
 - IV drug abuse
 - Diabetes
 - Presence of cutaneous ulcers; **OR**
- Pre-operative planning

Significant trauma

- Usually preceded by initial plain film radiographs

Tarsal coalition

- Following foot radiographs

Soft tissue mass

(any **one** of the following)

- Soft-tissue evaluation when prominent calcifications are seen on radiograph
- Spontaneous soft tissue hemorrhage with or without palpable mass
- Surveillance, without pathologic tissue confirmation, of an unexplained mass identified on prior imaging
- Following a non-diagnostic radiograph to evaluate a palpable mass found on physical exam

Note: MRI is typically preferred in the evaluation of soft tissue masses

Tumor evaluation: primary neoplasm or metastatic disease

(any **one** of the following)

- Biopsy-proven malignancy
- Surveillance, without pathologic tissue confirmation, of an unexplained mass identified on prior imaging

When the patient's condition meets the lower extremity MRI guidelines, but there is either a contraindication to MRI or the patient cannot tolerate MRI examination (for example, due to claustrophobia)

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Magnetic Resonance Imaging (MRI) Lower Extremity (Joint & Non-Joint)



CPT Codes

- 73718..... MRI lower extremity, other than joint, without contrast
- 73719..... MRI lower extremity, other than joint, with contrast
- 73720..... MRI lower extremity, other than joint, without contrast followed by re-imaging with contrast
- 73721..... MRI lower extremity, any joint, without contrast
- 73722..... MRI lower extremity, any joint, with contrast
- 73723..... MRI lower extremity, any joint, without contrast followed by re-imaging with contrast

Standard Anatomic Coverage

- Scan coverage depends on the specific clinical indication and varies considerably, based on anatomic and clinical considerations. If medically appropriate, an MRI exam may be requested for each major area of the right and left lower extremities: hip, thigh, knee, lower leg (calf), ankle, or foot (includes toes)
- Routine MRI examinations provide multi-planar imaging of the joint or non-joint region(s) of interest

Imaging Considerations

- Conventional radiographs should be obtained before advanced imaging
- Use of contrast (intravenous and intra-articular) is at the discretion of both the ordering and imaging physicians
- CT is often the preferred modality for evaluation of displaced fractures and subluxations, whereas stress fractures and some incomplete and non-displaced fractures may be better imaged with MRI or radionuclide bone scintigraphy
- MRI is often used to evaluate soft tissue abnormalities and to interrogate for possible osteomyelitis, despite negative or non-diagnostic plain films and/or triple-phase bone scintigraphy. One exception for osteomyelitis is detection of bone sequestra, which may be better depicted with CT
- If radiographic findings are typical of osteomyelitis, advanced imaging may not be necessary
- For suspected osteonecrosis, MRI is often more sensitive than CT or bone scintigraphy
- Implanted surgical hardware, including joint prostheses, may produce sufficient local artifact to preclude adequate imaging through the region containing hardware
- For suspected Baker's cysts, ultrasound should be performed before advanced imaging exams

Common Diagnostic Indications

This section contains general lower extremity, hip, knee, and ankle and foot indications.

General Lower Extremity

Abnormalities detected on other imaging studies which require additional clarification to direct treatment

Common Diagnostic Indications

Fracture evaluation⁵⁻¹²

(Any **one** of the following)

- To confirm a suspected occult/stress fracture following non-diagnostic initial radiographs at high risk sites:
 - Femoral neck/proximal femur
 - Tibia (anterior/lateral)
 - Patella
 - Medial malleolus
 - Talus
 - Navicular
 - Metatarsal base (second and fifth digits)
 - Great toe sesamoid
- To define the extent of an acute fracture when surgery is being considered
- To assess fracture healing for delayed union or non-union, when repeat radiographs are non-diagnostic

Hemarthrosis (bloody joint effusion)

- Documented by arthrocentesis except in cases when arthrocentesis is contraindicated (e.g. non-traumatic causes of hemarthrosis such as sickle cell, anticoagulant, or hemophilia)

Infectious process

- In a patient where focused history and physical exam suggest an underlying soft tissue infection when:
 - Patient is unresponsive to treatment including but not limited to antibiotics or incision/drainage
- Abscess - to determine the location and extent for surgical treatment
- Osteomyelitis – following non-diagnostic radiographs
- Fasciitis

Intraarticular loose body

- Following non-diagnostic radiographs

Note: Includes synovial osteochondromatosis

MRI accompanying an arthrogram (MR arthrography)

Myositis

- To determine optimal location for biopsy; **OR**
- To monitor treatment response

Osteochondral lesion

Osteonecrosis [avascular necrosis (AVN); aseptic necrosis]

- Requires initial plain films, prior to advanced imaging
- MRI is often the preferred imaging modality, particularly for evaluation during the early stages of osteonecrosis

Persistent lower extremity pain (excluding knee joint)

- In a patient where focused history and physical exam suggest non-specific lower extremity pain; **AND**
- Following non-diagnostic conventional radiographs; **AND**
- After a trial of conservative treatment (that may include physical therapy, NSAIDs, steroids unless contraindicated, for this current episode of pain); **AND**
- Patient fails to show substantial improvement on clinical re-evaluation

Note: For suspicion of specific etiology, please refer to corresponding indication

Pigmented Villonodular synovitis (PVNS)

Common Diagnostic Indications

Post-operative or post-procedure evaluation

Note: For post-operative evaluation of conditions not specifically referenced elsewhere in this guideline. This guideline does not include post-operative knee replacement for osteoarthritis

Preoperative or pre-procedure evaluation, for conditions other than knee replacements for osteoarthritis

Note: For preoperative evaluation of conditions not specifically referenced elsewhere in this guideline.

Exclusion: This indication does not apply to preoperative evaluation for primary total knee arthroplasty for osteoarthritis. Radiographs are typically sufficient for the preoperative evaluation for osteoarthritis prior to total knee arthroplasty.

Septic arthritis

- When any of the following risk factors are present:
 - Underlying joint disease
 - Joint prosthesis
 - IV drug abuse
 - Diabetes
 - Presence of cutaneous ulcers; **OR**
- Pre-operative planning

Significant trauma

- Usually preceded by initial plain film radiographs

Soft tissue mass

(any **one** of the following)

- Soft-tissue evaluation when prominent calcifications are seen on radiograph;
- Spontaneous soft tissue hemorrhage with or without palpable mass
- Surveillance, without pathologic tissue confirmation, of an unexplained mass identified on prior imaging
- Evaluation of a palpable soft tissue mass (excluding posterior knee masses) on physical examination following a non-diagnostic radiograph
- Evaluation of a palpable posterior knee mass on physical examination following a non-diagnostic radiograph **AND** a non-diagnostic ultrasound

Tumor evaluation: primary neoplasm or metastatic disease

(any **one** of the following)

- Biopsy-proven malignancy
- Surveillance, without pathologic tissue confirmation, of an unexplained mass identified on prior imaging

Hip Joint

Labral tear

Occult hip fracture

- With high clinical suspicion and negative or inconclusive hip radiographs

Knee Joint

Chondromalacia patella (patellofemoral pain syndrome)³

- In a patient following a focused history and physical exam; **AND**
- Following non-diagnostic conventional radiographs; **AND**
- Patient has completed a minimum of four (4) consecutive weeks of physician supervised conservative treatment for the current episode of pain; **AND**
- Patient fails to show substantial improvement on clinical re-evaluation

Common Diagnostic Indications

Ligament tear

- In a patient where focused history and physical exam suggests a ligament tear; **AND**
- Patient has completed a minimum of four (4) consecutive weeks of physician supervised conservative treatment for the current episode of pain, including but not limited to:
 - Physical therapy (home exercise only if physical therapy is not available); **AND**
- After trial of conservative treatment as listed above, patient fails to show substantial improvement on clinical re-evaluation; **OR**
- For pre-operative evaluation, based on physical exam findings which may include one of the following:
 - Positive Lachman test; **OR**
 - Positive pivot shift test; **OR**
 - Positive anterior or posterior drawer test; **OR**
 - Positive medial or lateral stress tests

Meniscal tear/injury

- In a patient where focused history and physical exam suggests a meniscal tear; **AND**
- Patient has completed a minimum of four (4) consecutive weeks of physician supervised conservative treatment for the current episode of pain, including but not limited to:
 - NSAIDs or steroids (oral or injection) – unless contraindicated; **AND**
 - Physical therapy (home exercise only if physical therapy is not available); **AND**
- After trial of conservative treatment as listed above, patient fails to show substantial improvement on clinical re-evaluation; **OR**
- For pre-operative evaluation, based on physical exam findings which may include one of the following:
 - Positive McMurray test with minimal knee flexion; **OR**
 - A severe twisting injury after which activity could not be resumed; **OR**
 - An anterior cruciate ligament tear is present; **OR**
 - Locking; **OR**
 - Swelling and symptoms develop immediately after an acute injury; **OR**
 - Inability to bear weight; **OR**
 - Inability to fully extend knee

Osteochondritis dissecans⁴

Post-operative evaluation following repair of a ligamentous or tendinous tear, with new symptoms

Ankle and Foot

Acute and chronic tendon injuries

- In a patient following a focused history and physical exam; **AND**
- Following non-diagnostic conventional radiographs; **AND**
- After a trial of conservative treatment (that may include physical therapy, for the current episode of pain); **AND**
- Patient fails to show substantial improvement on clinical re-evaluation

Acute tendon rupture

- For pre-operative evaluation based on
 - Severe muscle weakness from the involved tendon; **OR**
 - Non-diagnostic X-ray for bone avulsion; **OR**
 - Non-diagnostic ultrasound evaluation

Common Diagnostic Indications

Diabetic foot disease

- Osteomyelitis – following non-diagnostic radiographs

Morton's neuroma

- When the diagnosis is not clear on physical examination or ultrasound

Neuropathic osteodystrophy (Charcot joint)

- Following foot radiographs, when there is need for additional diagnostic information from an MRI exam to direct treatment decisions (such as concern for an underlying infectious process)

Plantar fasciitis

- For pre-operative evaluation following a failure of six (6) months of physician supervised conservative treatment

Tarsal coalition

- Following foot radiographs

Note: CT may be preferred for bony coalition

Tarsal tunnel

- Following EMG nerve conduction study if not responsive to four weeks of conservative treatment
- Neuropathy secondary to entrapment or compression of the posterior tibial nerve or its branches in the fibro-osseous tunnel, deep to the flexor retinaculum

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CPT Codes

- 73706..... Computed tomographic angiography, lower extremity, with contrast material(s), including noncontrast images, if performed, and image postprocessing
- 73725..... Magnetic resonance angiography, lower extremity, without and with contrast

Standard Anatomic Coverage

- Depends on the area of interest and may extend from the iliofemoral regions through the feet

Imaging Considerations

- Other generally available non-invasive arterial studies of the lower extremity circulation should be considered prior to advanced diagnostic imaging with CTA or MRA. These may include segmental systolic pressure measurements, plethysmographic analysis, continuous wave Doppler and/or duplex ultrasonography of the lower extremity arterial or venous circulations
- MRA should also be considered in patients with a history of either previous contrast reaction to intravascular administration of iodinated radiographic contrast material or atopy
- CT angiography utilizes the data obtained from standard CT imaging. An authorization request for a CT exam in addition to a CT angiography of the same anatomic area during the same imaging session is inappropriate
- A request for a CT lower extremity venogram is a request for a CTA of the lower extremity. A quick look at the vasculature of the lower extremity at the time of a CT or CTA of the chest for pulmonary embolism evaluation should not be separately entered or reported

Common Diagnostic Indications

Aneurysm / dilation

Arterial entrapment syndrome

Arteriovenous malformation (AVM) or fistula (AVF)

Critical ischemia

- For example, in diabetic vascular disease with ischemic ulcers or gangrene
-

Dissection

Intramural hematoma

Post-operative or post-procedure evaluation

Preoperative or pre-procedure evaluation

Note: This indication is for preoperative evaluation of conditions not specifically referenced elsewhere in this guideline.

Thromboembolic disease – arterial or venous

Common Diagnostic Indications

Vascular assessment for lower extremity claudication

- CPT coding for abdominal aortic and run-off evaluation, which involves image post-processing for three-dimensional reconstructions, should follow:
 - For CTA: 75635 - CTA of abdominal aorta and bilateral iliofemoral lower extremity run-off without contrast, followed by re-imaging with contrast
 - For MRA: 74185 - abdominal MRA and 73725 - bilateral lower extremity MRAs
- Either CTA or MRA is indicated in a patient with classic presenting symptoms of claudication from peripheral arterial disease, such as diminished / absent peripheral pulses and cramping pain in the legs (particularly in the thighs and calves) when walking, which disappears at rest
- In the absence of classic peripheral symptoms of claudication, then obtain a vascular surgical consultation and perform lower extremity non-invasive arterial evaluation, which may include the following: segmental systolic pressure measurements, segmental limb plethysmography, Continuous wave Doppler and duplex ultrasonography. Ankle brachial indices (ABI) of < 0.9 may undergo advanced imaging. Rest pain or severe occlusive disease typically occurs with ABI < 0.5

Vascular invasion or compression by a musculoskeletal neoplasm

Vasculitis

Venous compression, due to surrounding mass effect

Venous thrombosis

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