INTRODUCTION:

Magnetic resonance imaging shows the soft tissues and bones. With its multiplanar capabilities, high contrast and high spatial resolution, it is an accurate diagnostic tool for conditions affecting the joint and adjacent structures. MRI has the ability to positively influence clinicians' diagnoses and management plans for patients with conditions such as primary bone cancer, fractures, and abnormalities in ligaments, tendons/cartilages, septic arthritis, and infection/inflammation.

INDICATIONS FOR LOWER EXTREMITY MRI (FOOT, ANKLE, KNEE, LEG or HIP) (plain radiographs must precede MRI evaluation):

Evaluation of suspicious mass/tumor (unconfirmed cancer diagnosis):
- Initial evaluation of suspicious mass/tumor found on an imaging study, and needing clarification, or found by physical exam and remains non-diagnostic after x-ray or ultrasound is completed.
- Suspected tumor size increase or recurrence based on a sign, symptom, imaging study or abnormal lab value.
- Surveillance: One follow-up exam if initial evaluation is indeterminant and lesion remains suspicious for cancer. No further surveillance unless tumor is specified as highly suspicious, or change was found on last imaging.

Evaluation of known cancer:
- Initial staging of known cancer in the lower extremity.
- Follow-up of known cancer of patient undergoing active treatment within the past year.
- Known cancer with suspected lower extremity metastasis based on a sign, symptom, imaging study or abnormal lab value.
- Cancer surveillance: Once per year (last test must be over 10 months ago before new approval) for surveillance of known cancer.

For evaluation of known or suspected infection or inflammatory disease (e.g. osteomyelitis):
- Further evaluation of an abnormality or non-diagnostic findings on prior imaging.
- With abnormal physical, laboratory, and/or imaging findings.
- Known or suspected (based upon initial workup including x-ray) of septic arthritis or osteomyelitis.
For evaluation of suspected (AVN) avascular necrosis (i.e. aseptic necrosis, Legg-Calve-Perthes disease in children):
- Further evaluation of an abnormality or non-diagnostic findings on prior imaging.

For evaluation of suspected or known Auto Immune Disease, (e.g. rheumatoid arthritis):
- Known or suspected auto immune disease and non-diagnostic findings on prior imaging.

For evaluation of known or suspected fracture and/or injury:
- Further evaluation of an abnormality or non-diagnostic findings on prior imaging.
- Suspected fracture when imaging is negative or equivocal.
- Determine position of known fracture fragments/dislocation.

For evaluation of persistent pain and initial imaging (e.g. x-ray) has been performed:
- Chronic pain and/or persistent tenosynovitis unresponsive to conservative treatment*, which include - medical therapy (may include physical therapy or chiropractic treatments) and/or - physician supervised exercise** of at least four (4) weeks.

Pre-operative evaluation.

Post-operative/procedural evaluation:
- When imaging, physical or laboratory findings indicate joint infection, delayed or non-healing or other surgical/procedural complications.
- A follow-up study may be needed to help evaluate a patient’s progress after treatment, procedure, intervention or surgery. Documentation requires a medical reason that clearly indicates why additional imaging is needed for the type and area(s) requested.

Other indications for a Lower Extremity (Foot, Ankle, Knee, Leg or Hip) MRI:
- Abnormal bone scan and x-ray is non-diagnostic or requires further evaluation.
- MR arthrogram.
- To assess status of osteochondral abnormalities including osteochondral fractures, osteochondritis dissecans, treated osteochondral defects where physical or imaging findings suggest its presence.

Additional indication specific for FOOT or ANKLE MRI
- Chronic pain in a child or adolescent with painful rigid flat foot where imaging is unremarkable or equivocal or on clinician’s decision to evaluate for known or suspected tarsal coalition.
- Accompanied by physical findings of ligament damage such as an abnormal drawer test of the ankle or significant laxity on valgus or varus stress testing and/or joint space widening on x-rays.

Additional indications specific for KNEE MRI:
- Accompanied by blood in the joint (hemarthrosis) demonstrated by aspiration.
- Presence of a joint effusion.
- For evaluation of suspected Baker’s cyst or posterior knee swelling with ultrasound requiring further evaluation.
Accompanied by physical findings of a meniscal injury determined by physical examination tests (McMurray’s, Apley’s) or significant laxity on varus or valgus stress tests.

Accompanied by physical findings of anterior cruciate ligament (ACL) or posterior cruciate ligament (PCL) ligamental injury determined by the drawer test or the Lachman test.

Additional indications specific for HIP MRI:
- For evaluation of suspected slipped capital femoral epiphysis with non-diagnostic imaging.
- For any evaluation of patient with hip prosthesis or other implanted metallic hardware where prosthetic loosening or dysfunction is suspected on physical examination or imaging.
- Suspected labral tear of the hip with signs of clicking and pain with hip motion especially with hip flexion, internal rotation and adduction which can also be associated with locking and giving way sensations of the hip on ambulation.

ADDITIONAL INFORMATION RELATED TO A LOWER EXTREMITY MRI:

MRI imaging – Metal devices or foreign body fragments within the body, such as indwelling pacemakers and intracranial aneurysm surgical clips that are not compatible with the use of MRI, may be contraindicated. Other implanted metal devices in the patient as well as external devices such as portable O₂ tanks may also be contraindicated.

*Conservative Therapy* (musculoskeletal) should include a multimodality approach consisting of a combination of active and inactive components. Inactive components such as rest, ice, heat, modified activities, medical devices, (such as crutches, immobilizer, metal braces, orthotics, rigid stabilizer or splints, etc and not to include neoprene sleeves), medications, injections (bursal, and/or joint, not including trigger point), and diathermy, can be utilized. Active modalities may consist of physical therapy, a physician supervised home exercise program**, and/or chiropractic care. NOTE: for joint and extremity injuries, part of this combination may include the physician instructing patient to rest the area or stay off the injured part.

**Home Exercise Program - (HEP)** – the following two elements are required to meet guidelines for completion of conservative therapy:
- Information provided on exercise prescription/plan AND
- Follow up with member with information provided regarding completion of HEP (after suitable 4 week period), or inability to complete HEP due to physical reason-i.e. increased pain, inability to physically perform exercises. (Patient inconvenience or noncompliance without explanation does not constitute “inability to complete” HEP).

MRI and Knee Trauma - MRI is an effective means of evaluating internal derangements of the knee with a very high accuracy for detection of meniscal injury. On MRI of the knee, meniscal injury may appear “free-floating”, corresponding to a meniscal avulsion or detachment from the tibial plateau. The floating meniscus seen on MRI is a result of significant trauma. It may also be associated with significant ligamentous injury. The
results of the MRI are valuable to the surgeon as he plans to reattach the meniscus to the tibial plateau.

**MRI and Osteonecrosis** – Osteonecrosis is a complication of knee surgery which may be accompanied by new or persistent pain after meniscal surgery. It can be detected by MRI with subcortical low signal intensity of T1-weighted images with or without central high signal intensity on T2-weighted images. Osteonecrosis can result in collapse of the articular surface.

**MRI and Legg-Calve-Perthes Disease (LPD)** – This childhood condition is associated with an insufficient blood supply to the femoral head which is then at risk for osteonecrosis. Clinical signs of LPD include a limp with groin, thigh or knee pain. Flexion and adduction contractures may develop as the disease progresses and eventually movement may only occur in the flexion-extension plane. This condition is staged based on plain radiographic findings. MRI is used in identifying the early stage of LPD when normal plain films are normal. It is also used in preoperative planning to diagnose “hinge abduction” (lateral side of the femoral head contacts the acetabular margin and femoral head does not slide as it should). However, MRI is not used as a standard diagnostic tool.

**MRI and Septic Arthritis** – Young children and older adults are the most likely to develop septic arthritis in the hip joint. Early symptoms include pain in the hip, groin, or thigh along with a limping gait and fever. It is sometimes hard to differentiate this condition from transient synovitis, a less serious condition with no known long-term sequelae. MRI may help in the differential diagnosis of these two conditions. Coronal T1-weighted MRI, performed immediately after contrast administration, can evaluate blood perfusion at the femoral epiphysis.

**MRI and Slipped Capital Femoral Epiphysis** – This condition, where the femoral head is displaced in relation to the femoral neck, is the most common hip disorder in adolescents and it is more common in obese children. Its symptoms include a limping gait, groin pain, thigh pain and knee pain. Most cases are stable and the prognosis is good with early diagnosis and treatment. Unstable slipped capital femoral epiphysis may lead to avascular necrosis. MRI is used for diagnosis of slipped capital femoral epiphysis. Its image can be oriented to a plane orthogonal to the plane of the physic to detect edema in the area of the physis.

**MRI and Tarsal Coalition** – This is a congenital condition in which two or more bones in the midfoot or hindfoot are joined. It usually presents during late childhood or late adolescence and is associated with repetitive ankle sprains. Mild pain, deep in the subtalar joint and limited range of motion is clinical symptoms. Tarsal coalition is detectable on oblique radiographs, but these are not routinely obtained at many institutions. Clinical diagnosis is not simple; it requires the expertise of skilled examiners. MRI is valuable in diagnosing tarsal coalition because it allows differentiation of osseous from non-osseous coalitions and also depicts the extent of joint involvement as well as degenerative changes. It may also detect overgrowth of the medial aspect of the talus that may be associated with talocalcaneal coalitions.

**MRI and Ankle Fractures** – One of the most frequently injured areas of the skeleton is the ankle. These injuries may include ligament sprains as well as fractures. A suspected
fracture is first imaged with conventional radiographs in anteroposterior, internal oblique and lateral projections. MRI is normally not used in the initial imaging of suspected ankle fractures; MRI is more specific for ligamentous injuries. MRI may identify ankle ligament injuries associated with problematic subsets of ankle fracture.
REFERENCES


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