

2011 Imaging Criteria

Magnetic Resonance Imaging (MRI), Foot^(1, 2)

ICD-9-CM: 88.94

CPT: 73718, 73719, 73720, 73721, 73722, 73723

I/O Setting: Outpatient

INDICATION(S)

- 100 Suspected osteomyelitis
- 200 Soft tissue mass
- 300 Suspected bone tumor
- 400 Suspected stress fracture
- 500 Posterior tibial nerve compression, tarsal tunnel
- 600 Suspected tarsal coalition
- 700 Suspected avascular necrosis (osteonecrosis), metatarsal head

100 Suspected osteomyelitis **[Both]**110 Findings **[One]**⁽³⁾

- 111 ESR > 30 mm/hr
- 112 Temperature > 100.4 F(38.0 C)
- 113 WBC > 10,000/cu.mm($10 \times 10^9/L$)
- 114 Blood culture positive
- 115 C-reactive protein > 10 mg/L

120 Foot x-ray nondiagnostic for osteomyelitis⁽⁴⁾200 Soft tissue mass **[Both]**⁽⁵⁾210 Symptoms **[One]**

- 211 Foot pain
- 212 Entrapment neuropathy⁽⁶⁾

220 Findings **[One]**

- 221 Mass by PE and x-ray nondiagnostic for soft tissue mass
- 222 Mass by x-ray

300 Suspected bone tumor **[One]**^(7)*RIN, 8)

- 310 Sclerosis by x-ray
- 320 Periostitis by x-ray
- 330 Lytic/blastic mass by x-ray
- 340 Cortical destruction by x-ray
- 350 Pathologic fracture by x-ray⁽⁹⁾

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- 400 Suspected stress fracture **[All]**⁽¹⁰⁾
- 410 Stress to the area by Hx⁽¹¹⁾
- 420 Sx/findings at foot **[One]**
- 421 Tenderness at site of suspected injury
- 422 Pain increased by weight-bearing/inversion
- 430 No fracture by x-ray⁽¹²⁾
- 440 Continued pain after ≥ 4 wks conservative Rx⁽¹³⁾
- 500 Posterior tibial nerve compression, tarsal tunnel **[All]**^(14, 15)
- 510 Symptoms **[One]**
- 511 Pain/dysesthesia of plantar foot
- 512 Paresthesias of the sole of the foot
- 520 Findings **[One]**
- 521 Positive Tinel's sign⁽¹⁶⁾
- 522 Sensory impairment over medial plantar/lateral plantar nerve branches **[One]**^(17, 18)
- 1 Decreased 2-point discrimination
- 2 Decreased light touch/vibration
- 523 NCS consistent with compression at tarsal tunnel⁽¹⁹⁾
- 530 Continued Sx/findings **after** Rx **[All]**⁽²⁰⁾
- 531 NSAID **[One]**⁽²¹⁾
- 1 Rx ≥ 4 wks
- 2 Contraindicated/not tolerated⁽²²⁾
- 532 Heel wedge/arch support ≥ 6 wks
- 533 Corticosteroid injection **[One]**
- 1 Ineffective
- 2 Contraindicated/not tolerated/refused
- 600 Suspected tarsal coalition **[Both]**^(23, 24)
- 610 Sx/findings **[One]**
- 611 Pain at site
- 612 Rigid flatfoot
- 613 Pain increased with activity
- 614 Decreased ROM in midfoot and hindfoot⁽²⁵⁾
- 620 X-ray nondiagnostic for tarsal coalition⁽²⁶⁾
- 700 Suspected avascular necrosis (osteonecrosis), metatarsal head **[All]**^(27, 28)
- 710 Foot pain
- 720 Pain with passive ROM
- 730 Metatarsal fracture/nonunion of fracture by imaging⁽²⁹⁾
- 740 Foot x-ray nondiagnostic for avascular necrosis

750 Continued pain after immobilization \geq 6 wks

Notes

(1)

MRI has played an increasingly important role in the diagnosis and management of a wide range of foot abnormalities.

(2)

The following are examples of relative and absolute contraindications to the use of magnetic resonance imaging:

- Implanted devices that are electrically or magnetically activated (e.g., cardiac pacemakers, automatic cardioverter defibrillators, drug infusion pumps, cochlear implants)
- Ferromagnetic metal objects (e.g., cerebral aneurysm clips, intraocular metallic foreign body, prostheses, screws)
- Pregnancy, first trimester
- Renal insufficiency in cases when magnetic resonance imaging is performed with gadolinium-based contrast

(3)

If the patient is immunocompromised, fever may not be present and the WBC may be unchanged or low.

(4)

Although plain film radiography should be performed to initially evaluate the presence of infection, abnormalities of the foot may not be seen on x-ray until 2 to 4 weeks (Kapoor et al., Arch Intern Med 2007; 167(2): 125-132).

(5)

Although neither x-ray nor MRI is able to reliably determine whether a soft tissue mass is benign or malignant, MRI can localize and determine the extent of a soft tissue lesion (Balassy and Hormann, Eur J Radiol 2008; 68(2): 245-258).

(6)-DEF:

The nerves of the foot include the superficial peroneal, deep peroneal, tibial, sural, and saphenous. The saphenous nerve originates from the femoral nerve, whereas the other four nerves originate from the sciatic nerve.

(7)-RIN:

This indication addresses the initial diagnosis of a bone tumor, not the assessment of response to therapy. For suspected metastatic disease (pain at multiple sites, cancer by history) a bone scan provides information about occult metastases at other sites and is the appropriate initial study. For suspected metastatic disease, see the "Bone Scan" criteria subset.

(8)

MRI is needed in addition to x-ray to evaluate the extent of the tumor and associated soft tissue involvement, as well as in staging for resection (Balassy and Hormann, Eur J Radiol 2008; 68(2): 245-258).

(9)

A pathological fracture commonly presents in the calcaneus as unicameral bone cysts.

(10)-DEF:

A stress fracture is a partial or complete fracture of a bone due to repetitive loading. It may be further categorized as a fatigue fracture where histologic normal bone subject to repetitive stress fails or an insufficiency fracture that occurs when histologic abnormal bone, such as that found in an osteoporotic individual, fails from relatively normal stress (Joong and El-Khoury, Am Fam Physician 2007; 76(7): 975-983).

(11)

Activities (e.g., running, jumping, sprinting), foot anatomy, female gender, and age are all factors in the development of stress fractures. Individuals will frequently present with an insidious onset of vague, aching pain. Often a change in activity, such as increasing the duration or intensity of an exercise program, will cause enough stress to result in fatigue fractures, while routine activities may result in insufficiency fractures (DeLee et al., DeLee & Drez's orthopaedic sports medicine : principles and practice, 3rd ed. 2009.).

(12)

MRI may reveal stress fractures not visualized by radiographs. Initial radiographs to evaluate stress fractures of the foot are frequently negative, since changes may not be seen for 2 to 4 weeks after clinical symptoms present (Joong and El-Khoury, Am Fam Physician 2007; 76(7): 975-983).

(13)

Conservative therapy for this condition may include activity modification, immobilization, and NSAIDs.

(14)

The tarsal tunnel is the area under the flexor retinaculum between the medial malleolus and the calcaneus. In tarsal tunnel syndrome, the tibial nerve or any of its three terminal branches (the calcaneal, medial plantar, and lateral plantar branches) is compressed as it runs through this area, resulting in burning pain, paresthesias, and numbness in the sole of the foot and heel (Katirji, *Neurol Clin* 2002; 20(2): 479-501, vii).

(15)

MRI is helpful in providing detailed anatomy of the tarsal tunnel, as well as identifying space-occupying lesions (Hochman and Zilberfarb, *Radiol Clin North Am* 2004; 42(1): 221-245).

(16)-DEF:

A positive Tinel's sign is elicited when tapping over the tarsal tunnel results in discomfort or paresthesias over the area of posterior tibial nerve distribution.

(17)

Although the calcaneal nerve branch may be compressed in tarsal tunnel syndrome, sensation is often spared in this branch (Katirji, *Neurol Clin* 2002; 20(2): 479-501, vii).

(18)

Typical assessments of sensory function include light touch (e.g., monofilament testing), 2-point discrimination, or vibration. Other measures of sensory function (e.g., diminished temperature perception, joint position sense, deep pressure) are not substitutes for vibration, 2-point discrimination, or light touch.

(19)

The clinical diagnosis of tarsal tunnel syndrome is often difficult to make, as it needs to be distinguished from orthopedic, rheumatologic, and other neurologic conditions. A review of the use of NCS in the diagnosis of tarsal tunnel neuropathy showed limited evidence to support its use (Patel et al., *Muscle Nerve* 2005; 32(2): 236-240).

(20)

The listed treatment(s) may have occurred at any time in the course of the illness.

(21)-POL:

NSAIDs are preferred for the treatment of this condition because of their anti-inflammatory effect. It is a matter of local medical policy whether to accept acetaminophen or other analgesics as alternatives for NSAIDs.

(22)

Contraindications to NSAIDs may be absolute (e.g., pregnancy, history of allergic reaction) or relative (e.g., anticoagulant use, history of PUD).

(23)-DEF:

Tarsal coalition is an anomaly of the foot with variable degrees of union between tarsal bones (e.g., talus, calcaneus, cuboid, navicular). The most common types are talocalcaneal and calcaneonavicular. This anomaly results in rigidity of the foot and limited ROM.

(24)

Symptoms in tarsal coalition may progress from fibrous to cartilaginous to osseous coalition (Joong and El-Khoury, *Am Fam Physician* 2007; 76(7): 975-983). Pain occurs with the progression of the condition due to the subsequent restriction of motion, evident with activity.

(25)

While a decrease in subtalar motion during PE may or may not be present in a calcaneonavicular coalition, a marked decrease or absence of subtalar motion is considered the cardinal sign of a talocalcaneal coalition.

(26)

Suspected tarsal coalition is initially evaluated by plain radiographs, but fibrous or cartilaginous coalitions may be difficult to detect and imaging with CT or MRI is required.

(27)-DEF:

Avascular necrosis, (i.e., aseptic necrosis, osteonecrosis), is a degenerative condition of focal bone causing progressive pain and bony collapse. Numerous medical conditions predispose toward avascular necrosis, including alcoholism, chronic corticosteroid use, sickle cell disease, pancreatitis, trauma, SLE, and radiation therapy.

(28)

MRI is superior to bone scan for demonstrating avascular necrosis and is the test of choice if the plain x-ray is nondiagnostic.

(29)

The imaging study may be an x-ray, CT, or tomogram.