**Table B3. Summary of recommendations—adult ankle and foot disorders**

<table>
<thead>
<tr>
<th>Patient presentation</th>
<th>Recommendations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adult with acute ankle and foot injury but negative findings on the OAR</td>
<td>Radiographs not routinely indicated [B]</td>
</tr>
<tr>
<td>Consider radiographs only if patients excluded from the OAR:</td>
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<tr>
<td>• Multiple injuries</td>
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<tr>
<td>• Isolated skin injury</td>
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<tr>
<td>• 10 d since injury</td>
<td></td>
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<tr>
<td>• Obvious deformity of ankle or foot</td>
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<tr>
<td>• Altered sensorium: cognitive or sensory impairment (neurologic deficit), head trauma, intoxicated</td>
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<tr>
<td>Adult with acute ankle and foot injury and positive findings on the OAR</td>
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</tr>
<tr>
<td>(a) Ankle (positive OAR)</td>
<td>Ankle radiographs indicated [B] AP ankle, 20° medial oblique (mortise views) and lateral (include base of fifth metatarsal)</td>
</tr>
<tr>
<td>Radiographs required only if there is pain in the malleolar zone and any of these findings:</td>
<td>Additional views [D]: Stress radiographs after fibular fracture helpful pre-operatively to determine deltoid ligament status in orthopedic setting.</td>
</tr>
<tr>
<td>• Bone tenderness of distal fibula along posterior edge or tip of lateral malleolus (distal 6 cm)</td>
<td>Special investigations [D]</td>
</tr>
<tr>
<td>• Bone tenderness of distal tibia along posterior edge or tip of medial malleolus (distal 6 cm)</td>
<td>• MRI or CT appropriate in presence of significant pain and disability and negative radiographs</td>
</tr>
<tr>
<td>• Inability to bear weight both immediately and in clinic</td>
<td>• Fluoroscopic stress examination under anesthesia to assess ankle instability</td>
</tr>
<tr>
<td>Also consider taking ankle radiographs in:</td>
<td>• NM for persisting symptoms to exclude stress fracture</td>
</tr>
<tr>
<td>• Older patients with malleolar tenderness and pronounced soft tissue edema.</td>
<td></td>
</tr>
<tr>
<td>• Presence of positive OAR foot findings</td>
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<tr>
<td>(b) Foot (positive OAR)</td>
<td>Foot radiographs indicated [B]</td>
</tr>
<tr>
<td>Radiograph required only if there is pain in the midfoot zone and any of these findings:</td>
<td>When feasible, weight-bearing foot AP, lateral, medial oblique views</td>
</tr>
<tr>
<td>• Bone tenderness of base of fifth metatarsal</td>
<td>Comparison views (normal foot) may be helpful.</td>
</tr>
<tr>
<td>• Bone tenderness of navicular bone</td>
<td></td>
</tr>
<tr>
<td>• Unable to bear weight both immediately and in clinic</td>
<td>Additional view: tangential view of calcaneus for heel trauma cases</td>
</tr>
<tr>
<td>Adult with chronic ankle and tarsal pain</td>
<td>Radiographs indicated [D]</td>
</tr>
<tr>
<td>Specific indications for radiographs include:</td>
<td>AP ankle, lateral, medial oblique (mortise views)</td>
</tr>
<tr>
<td>• Suspected osteochondral lesion/stress fracture</td>
<td>(Medial oblique view helps evaluate the talocalcaneal relationship and lateral malleolus.)</td>
</tr>
<tr>
<td>• Suspected tendinopathy with possible inflammatory arthritis</td>
<td>Additional view: Stress radiographs may be considered, but little agreement exists as to which technique.</td>
</tr>
<tr>
<td>• Possible ankle instability. Single-leg jump test as clinical indicator of functional instability</td>
<td>Special investigations [D]</td>
</tr>
<tr>
<td>• Noninvestigated chronic ankle and tarsal pain</td>
<td>MRI is the gold standard for musculoskeletal assessment if radiography is positive or if unrelieved by 4 wk of conservative care.</td>
</tr>
<tr>
<td>• Multiple sites of degenerative joint disease as visualized on radiographs</td>
<td>• Contrast-enhanced, fat-suppressed, 3D, fast-gradient MRI may be useful in diagnosing synovitis and soft tissue impingement.</td>
</tr>
<tr>
<td>• Possible operative candidate</td>
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<tr>
<td>Specific clinical diagnoses</td>
<td></td>
</tr>
<tr>
<td>1. Impingement syndromes</td>
<td>Radiographs indicated [D]</td>
</tr>
<tr>
<td>Findings most strongly associated with abnormality at arthroscopy:</td>
<td>AP ankle, lateral and mortise views</td>
</tr>
<tr>
<td>• Anterolateral tenderness</td>
<td>Special investigations [D]</td>
</tr>
<tr>
<td>• Swelling</td>
<td>For all suspected impingement syndromes with positive radiographs or unrelieved by 4 wk of conservative care:</td>
</tr>
<tr>
<td>• Pain on single-leg squatting</td>
<td>• Contrast-enhanced, fat-suppressed, 3D, fast-gradient MRI may be indicated</td>
</tr>
<tr>
<td>• Pain on ankle dorsiflexion and eversion</td>
<td>depending on pain severity and disability.</td>
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</tbody>
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<table>
<thead>
<tr>
<th>Patient presentation</th>
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<tbody>
<tr>
<td><strong>(a) Anterolateral impingement</strong>&lt;br&gt;Clinical features:&lt;br&gt;• Mechanism: inversion injury&lt;br&gt;• Pain and localized tenderness in region of anteroinferior tibiobular and/or anterior talofibular ligament&lt;br&gt;• Positive impingement sign</td>
<td>Radiographs indicated [D]&lt;br&gt;AP, lateral, and mortise ankle views&lt;br&gt;Additional view: [D]&lt;br&gt;Stress radiographs may be considered.</td>
</tr>
<tr>
<td><strong>(b) Anterior impingement</strong>&lt;br&gt;Clinical features:&lt;br&gt;• Mechanism: supination or repeated dorsiflexion injury&lt;br&gt;• Anterior pain&lt;br&gt;• Painful and restricted dorsiflexion</td>
<td>Radiographs indicated [D]&lt;br&gt;AP, lateral, and mortise ankle views</td>
</tr>
<tr>
<td><strong>(c) Anteromedial impingement</strong>&lt;br&gt;Clinical features:&lt;br&gt;• Mechanism: inversion injury or ankle/talar fracture&lt;br&gt;• Anteromedial pain and tenderness&lt;br&gt;• Swelling&lt;br&gt;• Pain and restriction on dorsiflexion and supination</td>
<td>Radiographs indicated [D]&lt;br&gt;AP, lateral, and mortise ankle views</td>
</tr>
<tr>
<td><strong>(d) Posterior impingement</strong>&lt;br&gt;Clinical features:&lt;br&gt;• Mechanism: impingement of os trigonum between talus and posterior tibia&lt;br&gt;• Common in ballet dancers&lt;br&gt;• Pain elicited with full weight-bearing in maximum plantar flexion, especially when os trigonum is present.&lt;br&gt;• Tenderness behind lateral malleolus</td>
<td>Radiographs indicated [D]&lt;br&gt;AP, lateral, and mortise ankle views&lt;br&gt;Special investigations [D]&lt;br&gt;MRI for os trigonum syndrome&lt;br&gt;• Pain with passive plantar flexion</td>
</tr>
<tr>
<td><strong>2. Peroneal tendinosis</strong>&lt;br&gt;Clinical features:&lt;br&gt;• Lateral hindfoot pain&lt;br&gt;• Cavovalgus foot deformity&lt;br&gt;• Frequently affected in RA</td>
<td>Radiographs not routinely indicated [D]&lt;br&gt;Unless unrelieved by 4 wk of conservative care or patient has a suspected inflammatory arthritis&lt;br&gt;Special investigations [D]&lt;br&gt;US or MRI if there are signs of popping or clicking with foot eversion</td>
</tr>
<tr>
<td><strong>3. Lateral premalleolar bursitis</strong>&lt;br&gt;Clinical features:&lt;br&gt;• Adventitious bursa develops after prolonged sitting with inverted and plantar flexed feet</td>
<td>Radiographs not routinely indicated [GPP]&lt;br&gt;Special investigations [GPP]&lt;br&gt;US if unrelieved by 4 wk of conservative care</td>
</tr>
<tr>
<td><strong>4. Tarsal tunnel syndrome</strong>&lt;br&gt;Clinical features:&lt;br&gt;• Tingling pain and burning over the sole of the foot after prolonged standing or walking&lt;br&gt;• Worse at night in some&lt;br&gt;• Positive Tinel sign&lt;br&gt;• Positive nerve compression test&lt;br&gt;• 2-Point discrimination&lt;br&gt;• Hypoesthesia on sole of foot&lt;br&gt;• Rare weakness of toe flexion</td>
<td>Radiographs not routinely indicated [D]&lt;br&gt;Special investigations [D]&lt;br&gt;US or MRI for nerve and other soft tissue visualization&lt;br&gt;CT for bony abnormalities&lt;br&gt;Sensory conduction velocity and distal motor latency useful for diagnosis and treatment progression&lt;br&gt;2-Point discrimination&lt;br&gt;Hypoesthesia on sole of foot&lt;br&gt;Rare weakness of toe flexion</td>
</tr>
<tr>
<td><strong>Adult with chronic foot pain</strong>&lt;br&gt;Clinical features:</td>
<td>Radiographs generally indicated [C]&lt;br&gt;Non-weight-bearing AP, lateral, medial, and lateral oblique views&lt;br&gt;Additional views:&lt;br&gt;• Lateral views for toes&lt;br&gt;• Axial and lateromedial tangential views for sesamoid bones&lt;br&gt;Special investigations [D]&lt;br&gt;• NM, MRI, US, arthrography may be useful&lt;br&gt;• Laboratory investigations (blood and synovial fluid) recommended</td>
</tr>
<tr>
<td><strong>A. Hindfoot-Heel pain</strong>&lt;br&gt;Clinical features:</td>
<td>Radiographs indicated [D]&lt;br&gt;AP, lateral, and medial oblique views of the foot&lt;br&gt;Additional views: tangential view of the calcaneus and lateral calcaneus view</td>
</tr>
</tbody>
</table>
### Table (continued) (B3 (continued))

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>Special investigations [D]</td>
<td></td>
</tr>
<tr>
<td>• MRI if unrelieved by 4 wk of conservative care or before referral for medical care or to podiatrist</td>
<td></td>
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<tr>
<td>• Achilles enthesisopathy: power Doppler sonography may show neovascularization, which may be the cause of pain.</td>
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</table>

### Specific clinical diagnoses

#### A1. Plantar fasciitis (PF) and calcaneal enthesisophyte (spur) disorder

**Clinical features:**
- PF is one of the most common soft tissue foot disorders
- Hyperesthesia over the plantar fascia
- Risk factors:
  - Decreased ankle dorsiflexion (≤0°)
  - Being on their feet most of working day
  - Obesity (body mass index N30 kg/m²)

**Recommendations**
- Radiographs not routinely indicated except in young athlete [B]
  - AP, lateral, and oblique views

**Special investigations [D]**
- US may be initial step for advanced imaging (readily available, highly sensitive, low-cost, and radiation-free).
  - Doppler/power US improves US value
- US, MRI, and bone scan are more sensitive in showing inflammatory changes and thickening of the plantar aponeurosis in PF

#### A2. Sinus tarsi syndrome

**Clinical features:**
- Mechanism: inversion injury or inflammatory joint diseases
- Lateral foot pain
- Perceived foot instability
- Tenderness of the sinus tarsi

**Recommendations**
- Radiographs not initially indicated [D]

**Special investigations [D]**
- MRI if unrelieved by 4 wk of conservative care: may be helpful for detecting subtle unilateral deformities

#### B. Midfoot pain (nontraumatic)

**Midfoot pain usually self-limiting.**

**Differential diagnosis:**
- RA
- Pediatric arthritis
- Reactive arthritis (Reiter disease)
- Diabetic neuroarthropathy/Charcot joints
- Gout
- Diabetic infection

**Recommendations**
- Radiographs indicated if unrelieved by 4 wk of conservative care or in suspected inflammatory arthritis [D]
  - AP, medial oblique, and lateral views of the foot
- Additional views: weight-bearing ankle series may be useful

**Special investigations if radiography is positive or if unrelieved by 4 wk of conservative care [GPP]**
- CT or MRI warranted in suspected or proven disease, but negative/equivocal radiographs

#### B1. Acquired flat foot with posterior tibial tendon dysfunction/rupture

**Clinical features:**
- Medial ankle/foot pain initially
- May lead to disabling weight bearing symptoms
- Talonavicular subluxation
- Difficulty or inability to perform single-limb heel rise
- Weak resisted inversion of fully flexed foot

**Recommendations**
- Radiographs indicated if unrelieved by 4 wk of conservative care or in suspected inflammatory arthritis [D]
  - AP, medial oblique, and lateral foot radiographs
- Additional views: weight-bearing ankle series may be useful

**Special investigations [D]**
- MRI better at differential diagnosis of medial ankle/foot pain
- US may be useful

#### B2. Navicular tuberosity pain and tenderness

**Potential painful normal variants such as accessory navicular bone (4%-21% of the population) have been described.**

**Painful fibro-osseous junction of the accessory bone**

**Recommendations**
- Radiographs indicated if unrelieved by 4 wk of conservative care [C]
  - AP, medial oblique, and lateral foot views

**Special investigations [GPP]**
- MRI to differentiate accessory navicular from an avulsion fracture
- NM may be useful to help identify or confirm site of pain.

#### B3. Complex regional pain syndrome

**Synonyms:**
- Reflex sympathetic dystrophy
- Sudek's atrophy

**Clinical features:**
- Pain

**Recommendations**
- Radiographs indicated [D]
  - AP, lateral, and medial oblique views of the foot

**Special investigations [D]**
- MRI is useful in detecting numerous soft tissue and earlier bone and joint processes that are not depicted or as well characterized with other imaging modalities
- 3-Phase NM scan recommended if radiograph is not diagnostic

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<table>
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<tr>
<td>• Tenderness</td>
<td>Radiographs not routinely indicated unless unresponsive to 4 wk of conservative care or if inflammatory or infectious etiology suspected [B]</td>
</tr>
<tr>
<td>• Swelling</td>
<td>AP and lateral foot views</td>
</tr>
<tr>
<td>• Diminished motor function</td>
<td></td>
</tr>
<tr>
<td>• Vasomotor and sudomotor instability</td>
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<tr>
<td>C. Forefoot pain</td>
<td>Special investigations [D]</td>
</tr>
<tr>
<td>See recommendations for the following specific clinical diagnoses:</td>
<td></td>
</tr>
<tr>
<td>C1. Metatarsal bursitis</td>
<td>MRI useful in differential diagnosis of forefoot pain such as stress fracture, metatarsophalangeal synovitis, and intermetatarsal bursitis</td>
</tr>
<tr>
<td>C2. Morton neuroma</td>
<td>MRI useful in differential diagnosis of forefoot pain such as stress fracture, metatarsophalangeal synovitis, and intermetatarsal bursitis</td>
</tr>
<tr>
<td>C3. Stress fracture</td>
<td>MRI useful in differential diagnosis of forefoot pain such as stress fracture, metatarsophalangeal synovitis, and intermetatarsal bursitis</td>
</tr>
<tr>
<td>C4. Avascular necrosis (osteonecrosis)</td>
<td>MRI useful in differential diagnosis of forefoot pain such as stress fracture, metatarsophalangeal synovitis, and intermetatarsal bursitis</td>
</tr>
<tr>
<td>C5. Hallux rigidus and hallux valgus</td>
<td>MRI useful in differential diagnosis of forefoot pain such as stress fracture, metatarsophalangeal synovitis, and intermetatarsal bursitis</td>
</tr>
<tr>
<td>C6. Sesamoiditis</td>
<td>MRI useful in differential diagnosis of forefoot pain such as stress fracture, metatarsophalangeal synovitis, and intermetatarsal bursitis</td>
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</tbody>
</table>

| C1. Metatarsal bursitis | Radiographs not routinely indicated unless unresponsive to 4 wk of conservative care, or if inflammatory or infectious etiology suspected [GPP] AP and lateral foot views |
| C2. Morton neuroma      | Radiographs indicated [C] AP, lateral, with or without oblique Special investigations [D] MRI |
| C3. Stress (fatigue or insufficiency) fracture | Radiographs indicated [D] AP and lateral foot views with or without medial oblique specific to the area of complaint Special investigations [C] High-field MRI with fat suppression or inversion recovery protocol. As sensitive as NM CT still uncertain; some centers use US |
| C4. Osteonecrosis of metatarsal head (Freiberg infraction) | Radiographs indicated [C] AP, lateral, with or without medial oblique of the foot Special investigations [C] MRI modality of choice to evaluate bone marrow changes in early stages |
| C5. Hallux rigidus and hallux valgus (first metatarsophalangeal joint) | Radiographs not routinely indicated unless unresponsive to 4 wk of conservative care [D] Lateral view most useful for dorsal osteophyte on the metatarsal head and possible osseous fragments Additional view: Weight-bearing series to quantify degree of valgus deformity |
| C6. Sesamoiditis       | Radiographs not routinely indicated unless unresponsive to 4 wk of conservative care [D] Additional view: Lateromedial and tangential views for sesamoid bones Special investigations [GPP] MRI to differentiate from turf toe |