Diagnostic Imaging Pathways - Ankle Injury

Population Covered By The Guidance

This pathway provides guidance on imaging adult patients with suspected traumatic ankle injuries. It incorporates the Ottawa Ankle Rules.

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Quick User Guide

Move the mouse cursor over the PINK text boxes inside the flow chart to bring up a pop up box with salient points.
Clicking on the PINK text box will bring up the full text.
The relative radiation level (RRL) of each imaging investigation is displayed in the pop up box.

SYMBOL	RRL	EFFECTIVE DOSE RANGE
	None	0
	Minimal	< 1 millisieverts
	Low	1-5 mSv
	Medium	5-10 mSv
	High	>10 mSv

Pathway Diagram

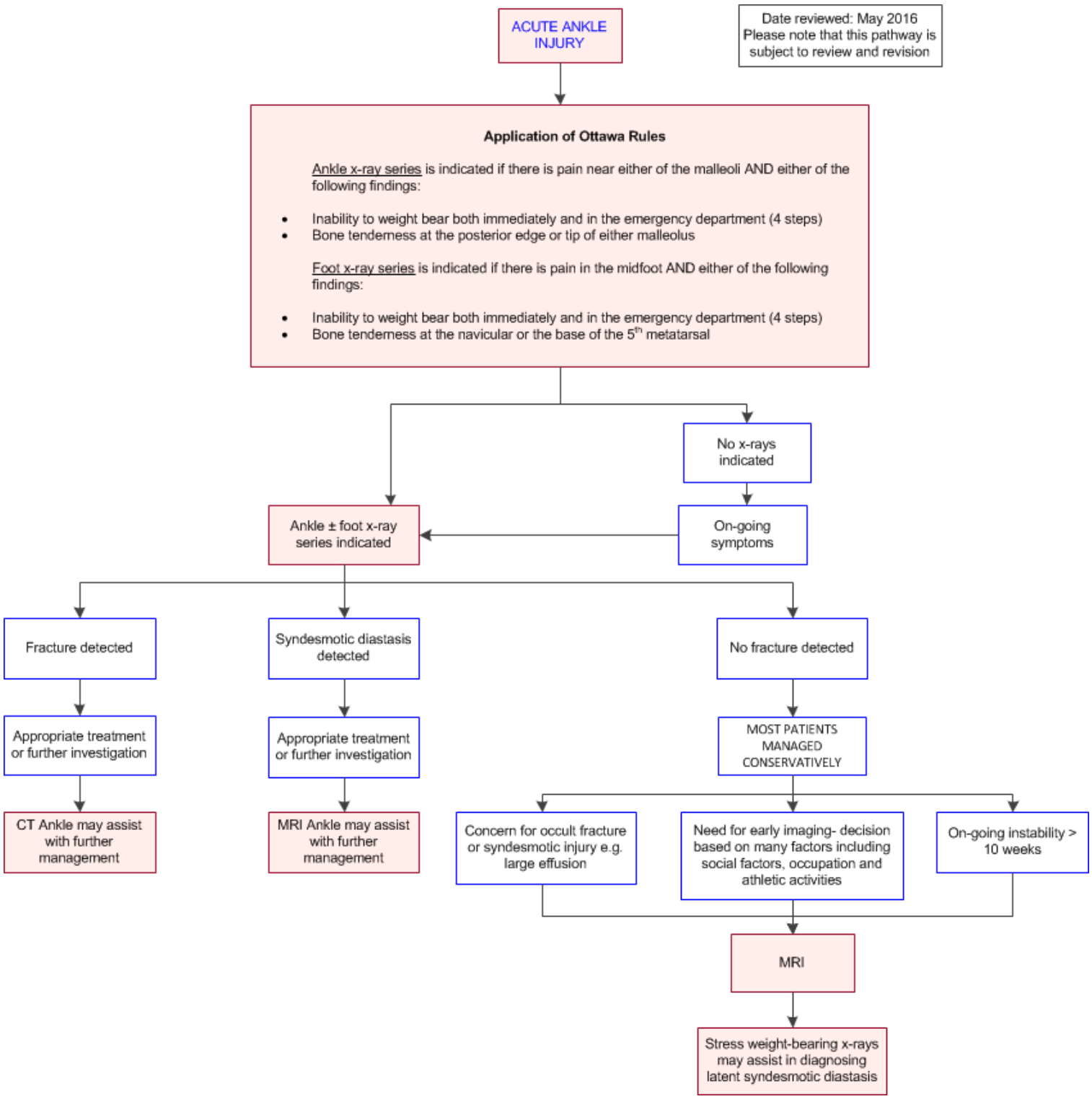


Image Gallery

Note: These images open in a new page

1a **Tri-malleolar Fracture**

Image 1a (Plain Radiograph): Lateral view demonstrating a posterior tibial

fracture.

1b

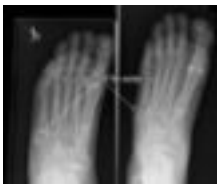
Image 1b (Plain Radiograph): AP view demonstrating fractures through both medial and lateral malleoli.

2

Lateral Malleolus Fracture of Right Ankle

Image 2 (Plain Radiograph): Oblique fracture of the lateral malleolus of the right ankle. There is lateral displacement within the ankle mortise with widening of the medial joint space.

3



Fractured Fifth metatarsal

Image 3 (Plain Radiograph): Fracture of the base of the 5th metatarsal.

4

Talar Dome Fracture

Image 4 (Magnetic Resonance Imaging): Sagittal proton density image showing a chronic undisplaced osteochondral talar dome fracture.

Teaching Points

- Most patients presenting following acute ankle injury can be managed conservatively and do not require imaging
- The Ottawa Ankle Rules and Ottawa Foot Rules should be used to select patients who require ankle and/or foot radiography and can safely exclude those who do not require imaging
- MRI of the ankle may be useful in selective patients and may assist in further management
- CT of the ankle is not indicated as the initial investigation but may assist with further management
- Stress radiography may be useful in suspected latent syndesmotic diastasis

Acute Ankle Injury

- Ankle injury is a common reason for presentation to the emergency department and in the general practice setting
- In those presenting with acute ankle injury, the incidence of ankle fracture is low (2-20% amongst

those who undergo evaluation with radiography) 1, 2
- Soft tissue injuries are the most common diagnosis following ankle injury, with up to 85% of ankle sprains involving the lateral ligament complex ('lateral ankle sprain') 3. This can be diagnosed clinically and in most, imaging is not required 2
- The Ottawa Ankle Rules (OAR) safely excludes patients who do not have a fracture following acute ankle injury and assists in selecting patients who require imaging

Ottawa Ankle Rules (OAR)

- The Ottawa Ankle and Foot Rules are clinical decision rules derived for predicting which patients have a fracture following acute ankle/foot injury in order to assist in selecting those who require radiography 4
- These rules were refined and validated prospectively on 453 patients 5
- The OAR have been prospectively applied in several other studies 6-11 and in all but one 6 have resulted in a significant reduction in the use of ankle and foot radiographs (19-34%) without missing any clinically significant fractures
- In one systematic review and meta-analysis summarising the evidence on the accuracy of the OAR for excluding fractures of the ankle and mid-foot, the pooled sensitivity was high (> 96%) when the OAR were applied within 48 hours following injury. 12 Less than 2% of patients who were negative for fracture according to the OAR actually had a fracture 12
- In one series, implementation of the OAR resulted in a decrease in the use of ankle radiography by 28% and foot radiography by 14% without affecting the incidence of fracture detection 13
- The OAR are validated in adults and children > 5 years. They should not be used in patients with decreased sensation or inability to communicate 1
- The specificity of the OAR ranged from 26-48% in one study. 12 Modified OAR have been suggested to increase its specificity but have not been validated 1, 14

Plain Radiography of the Ankle and Foot

- An ankle x-ray series usually consists of anteroposterior (AP), lateral and mortise views. The fifth metatarsal distal to the tuberosity should be seen in at least one projection 1
- The presence of an ankle effusion is best appreciated on the lateral view and is an important finding as a large effusion may represent an occult fracture 15
- In one series, 33% of patients with an ankle effusion but no detectable fracture on radiography had an occult fracture confirmed on computed tomography. 15 The positive predictive value for occult fracture is generally greater for larger effusions (0.5 for 8mm, 0.86 for 15mm) 15 and a cut off of > 15mm has been suggested to prompt further cross-sectional imaging with MRI 1, 2, 16
- A foot x-ray series usually consists of AP, oblique and lateral view

Magnetic Resonance Imaging (MRI) of the Ankle

- MRI can detect rupture of lateral ligaments with a sensitivity of 75-100%. 2, 17 However, it is not routinely performed in this setting as findings do not correlate with clinical outcome 18 and most ligamentous injuries heal with sufficient strength to maintain joint stability with conservative management 1, 2
- For injuries of the tibiofibular syndesmosis, MRI has a sensitivity of 100% and specificity of 70-100% 19

- Limitations of MRI include 2
    - High cost
    - Longer examination time
    - Less availability
- For these reasons and the high incidence of sprained ankle, MRI has been recommended for 1, 2, 20
    - Detection of occult fractures
    - Injuries of the tibiofibular syndesmosis
    - Chronic instability of the ankle
    - Suspected osteochondral lesions
    - When there is a need for an early imaging-based decision such as with high-performance athletes

Computed Tomography (CT) of the Ankle

- CT is not indicated for initial imaging in acute ankle injury. 1, 14 It may assist with further management following diagnosis with x-ray 1, 21
- Although an uncommon injury, fractures of the talus are negative in up to 40% of plain radiographs 1
- Lateral process fractures of the talus are most common in snowboarders and should be suspected when there is a history of inversion with dorsiflexion, together with tenderness over the lateral aspect of the talus 22
- Although there is limited evidence regarding the diagnostic accuracy of CT in ankle injury, it has been recommended for assessing the degree of displacement in the preoperative panning for fractures of the talus 1

Stress Weight-bearing Radiography

- Syndesmotic injuries (high ankle sprain) can be challenging to diagnose on static radiographs, as the fibula remains reduced. Some syndesmotic injuries, particularly Grade II, may be occultly unstable and if left untreated, can result in chronic instability, pain, degenerative joint disease and predispose to further injury 23
- In addition to a thorough clinical examination (including special tests such as the external rotation test), stress weight bearing radiographs (where tolerated by the patient) may assist in detecting latent syndesmotic injury 24
- Classically, syndesmotic injuries may be present if radiographs show increased tibiofibular clear space, decreased tibiofibular overlap and/or increased medial clear space 25

References

Date of literature search: June 2016

The search methodology is available on request. Email

References are graded from Level I to V according to the Oxford Centre for Evidence-Based Medicine, Levels of Evidence. Download the document

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