A Pain in the Ankle

How to Assess?

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The Case of Mr. Jones

Mr. Jones, a 45-year-old construction worker, twisted his left ankle at work. The ankle is deformed. On examination, the ankle is tender to palpation over the medial malleolus and the proximal fibula. The neurovascular exam is normal. X-ray findings are shown in Figure 1 on page 100.

There are an estimated 500,000 ankle injuries occurring in Canada each year. Musculoskeletal complaints comprise approximately one of seven patient visits to primary care physicians, with ankle pain being one of the most common presentations. The nature of the joint, and its significant weight bearing function relative to its surface area, make the ankle both prone to acute injury and chronic degenerative changes, as well as the cause of significant morbidity as a manifestation of systemic musculoskeletal disease.

The Case of Mrs. Smith

Mrs. Smith, 34, fell six months ago. She has pain in her left ankle that has not resolved. She now walks with a limp, and has swelling around her ankle. She is neurovascularly intact. X-rays at the time of the injury were unremarkable.

What to look for in a physical exam?

Aspects of the physical exam are outlined in Table 1. The components and sequence of the physical examination will be guided by the information obtained on initial patient assessment (Figure 2), and in the history. Due to considerable inherent patient differences, comparison to the uninvolved joint is always advisable (Table 2). If radiographic imaging is

Figure 1. Maisoneuve fracture. Excessive rotation force at the ankle caused disruption of the syndesmotic ligaments, and transmission of the stresses up the interosseus membrane resulting in an oblique fracture of the proximal fibula. Note the loss of the tibiofibular overlap and lateral displacement of the talus indicating syndesmosis compromise.

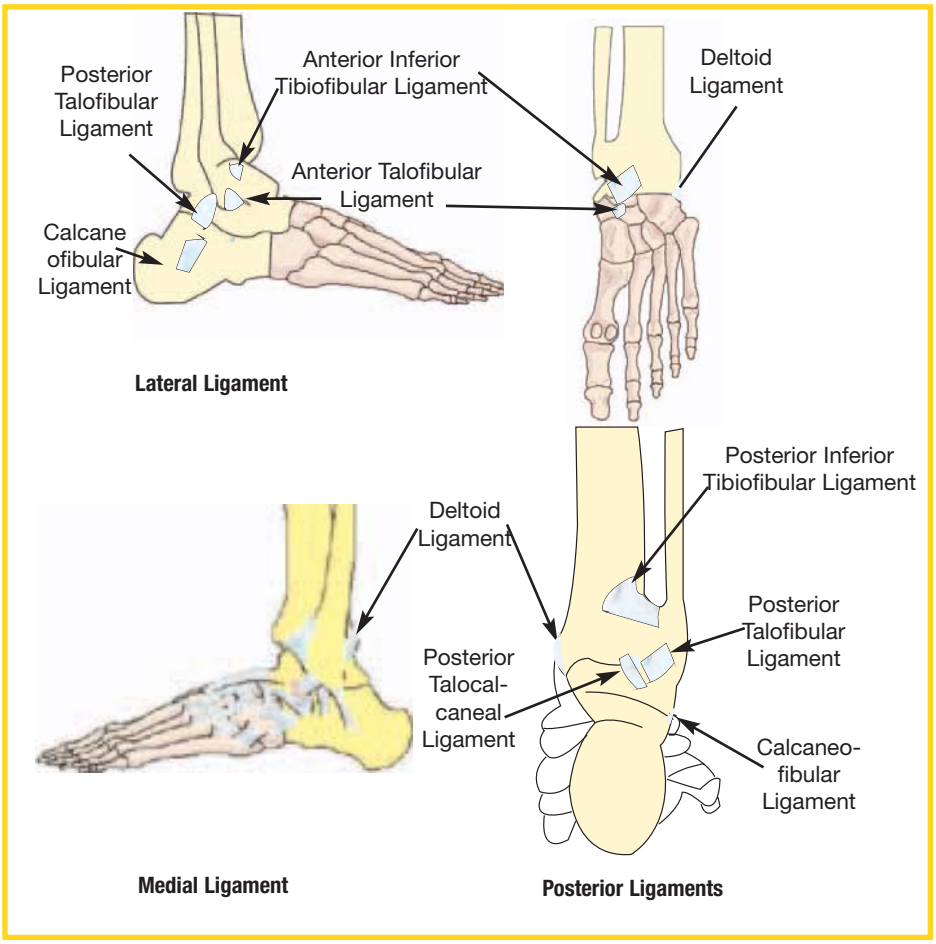

Figure 2. Ligaments of the ankle joint. (from www.jointinjury.com/ankle/page4).

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indicated based on clinical experience, or on the key signs of the Ottawa Ankle Rules (99% to 100% sensitivity, with a specificity > 50%), further physical exam should be discontinued until assured as to bony integrity (Table 3). Assessing neurovascular status remains a priority, particularly if there is concern as to a compartment syndrome of the lower leg requiring urgent intervention.

Ankle Injuries

Table 1
A Systematic Approach to Ankle Pain

History

- Is the ankle pain part of a polyarthritic pattern of musculoskeletal pain?
- What is the character of the pain: dull or sharp?
- How long has the patient been experiencing this pain?
- Is there a remote history of trauma to the ankle? Fracture, sprain, or osteochondral injury?
- If the pain can be traced to an acute event, what was the mechanism of injury?
- Are there any systemic symptoms, such as fever or recent illnesses?
- Is the patient able to bear weight?
- Does the patient perceive that the ankle locks or is unstable?
- Does the patient have morning ankle stiffness?
- Has the patient recently changed activity levels, footwear, or training methods?

Physical Exam

- Compare the injured ankle to the contralateral ankle joint.
- Examine the ankle for the presence and location of obvious deformities, erythema, warmth, swelling, ecchymoses, abrasions, and open wounds.
- Assess neurovascular status.
- Assess pain to direct palpation.
- Examine the back, hip, and knee to rule out referred pain, or account for gait abnormalities.
- Provocative testing (see Table 4)
- Three views of the ankle
    - Anteroposterior
    - Lateral
    - Mortise (15 degrees internal rotation)
- Stress testing—ligamentous disruption
- Computed tomography scans—bony details
- Magnetic resonance imaging—soft tissue

Are there other tests?

Provocative testing is useful in the diagnosis of ankle pain by assessing the integrity of the tendons and ligament complexes. Formally assessing gait and asking the patient to walk on toes, heels, hop on each foot, and run in figure eights may be helpful in identifying actions eliciting pain in non-acute presentations. Other provocative tests are outlined in Table 4.

Table 2

Causes of Ankle Pain

1. Traumatic

Fractures

- Tibial or fibular malleolar fractures
- Pilon fractures
- Maissoneuve fractures
- Talar dome fractures
- Talar body fractures

Sprains

- Deltoid ligament
- Lateral collateral ligaments
- Syndesmotic ligaments

Tendinopathies

- Achilles, peroneal or posterior tibial tendon ruptures, strains or subluxation
- Tenosynovitis
- Achilles enthesitis

Bursitis

Nerve Injury

2. Non Traumatic

Arthritis

- Osteoarthritis
- Septic
- Inflammatory

Crystal Deposition Disorders

- Gout
- Pseudogout

Osteomyelitis

Tibial tunnel syndrome

Impingement syndrome

Diabetic Charcot joint

Avascular necrosis

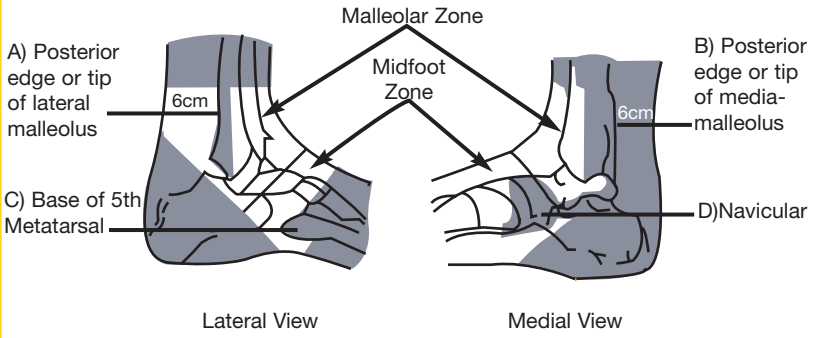
Neoplasm

Referred pain

Ankle Injuries

Table 3

Ottawa Ankle Rules



An ankle radiographic series is only required if there is any pain in the malleolar zone and any of these findings:

1. Bone tenderness at A.
2. Bone tenderness at B.
3. Inability to bear weight both immediately and in the emergency department.

A foot radiographic series is only required if there is any pain in the midfoot zone and any of these findings:

1. Bone tenderness at C.
2. Bone tenderness at D.
3. Inability to bear weight both immediately and in the emergency department.

Table 4

Provocative Tests to Help Diagnosis

Anterior Drawer Test: Performed by stabilising the lower leg with the non-dominant hand while an anterior force is applied to the patient's heel with the dominant hand, allowing assessment of the integrity of the anterior talofibular ligament and calcaneofibular ligament.

Talar Tilt Testing: Stabilise the lower leg, grasp the hind foot with the dominant hand, and with the ankle in slight plantarflexion, apply inversion and eversion forces. A 5% to 10% difference between ankles indicates compromise of the tested ligament complex.

External Rotation Test: Evaluates the integrity of the syndesmotic ligaments. Holding the leg and foot similar to the talar tilt test in the neutral position, internal and external rotational forces are applied to the foot.

The Squeeze Test: Evaluates the tibiofibular interosseous membrane and syndesmotic ligaments, and is accomplished by compression of the fibula and tibia at the midcalf. Pain distally over the tibiofibular syndesmosis is considered a positive test.

The Thompson Test: Used to assess for achilles tendon integrity. With the patient kneeling or prone with the foot extending beyond the edge of the table, the soleus is squeezed just distal to the heads of the gastrocnemius. With a normal test, the foot should plantar flex slightly. Pain, or diminished plantar flexion, when compared to the uninjured side suggests partial or complete rupture of the achilles tendon.

What about imaging?

Radiographs: Typically, three views of the ankle should be ordered; anteroposterior (AP), lateral, and mortise. Comparison to the uninjured ankle can occasionally be helpful. The AP should include the entire length of the fibula if any tenderness above the joint line is elicited in the physical exam to rule out a proximal fibular fracture, also known as a Maisoneuve fracture. In addition to the detection of obvious fractures of the bony structures, assessment of the tibiofibular clear space, tibiofibular overlap, and talar tilt or shift, serves to identify any compromise of the syndesmotic structures on the AP view (Figures 2 and 3). Posterior displacement of the fibula in the lateral view suggests fracture or loss of syndesmotic integrity.

The mortise view differs from the AP since the leg is internally rotated 15 degrees to 20 degrees, and permits assessment of the congruency of the articular surfaces and length of the

Table 5

Besides radiographs, what other imaging should be ordered?

Computed Tomography (CT)

- Allows for more detailed evaluation of bony structures, particularly when the fracture pattern is complex and inadequately visualised on plain radiographs.
- Newer advances in three dimensional CT reconstruction may increase the diagnostic yield in difficult cases and allow for planning of surgical intervention.

Magnetic Resonance Imaging

- Useful in identifying soft tissue injuries, incomplete or subtle fractures, osteochondral injuries, and for evaluating changes associated with osteonecrosis.

Bone Scans

- Limited to chronic ankle pain or dysfunction with osteoblastic activity associated with remodeling at pathologic sites, demonstrated by increased uptake.

Arthroscopy

- Allows for direct visualisation and possibly management of osteochondral lesions, soft tissue impingement and joint laxity associated with syndesmosis compromise.

fibula relative to the tibia. Other kinds of imaging required are outlined in Table 5.

What about ankle fractures?

Common ankle fractures include, the medial malleolus and/or distal fibula, with the fracture pattern often predictable, based on the mechanism of injury.

Pilon fractures, also known as tibial plafond fractures, are complex fractures of the distal

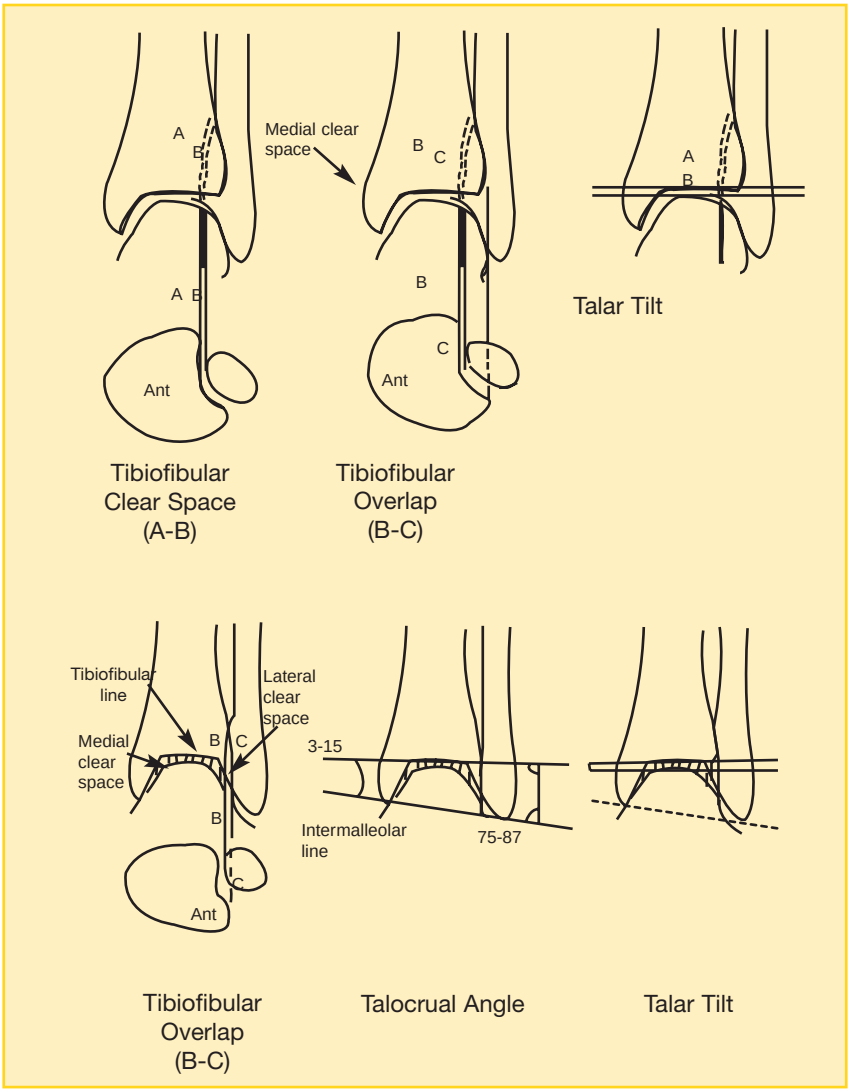


Figure 3. Assessment of AP and mortise radiographic views of the ankle. On an AP view (A), the tibiofibular clear space should be less than 5 mm, with a tibiofibular overlap of 10 mm. Talar tilt should be 0 degrees. Values of the talocrural angles are indicated. Comparison to the contralateral ankle may prove more diagnostic than absolute values.

tibia. The mechanism of injury is usually an excessive axial load that drives the talus into the distal tibia, resulting in a frequently comminuted fracture of the tibial metaphysis, with intra-articular involvement. Pilon fractures require early orthopaedic assessment, since the long-term prognosis depends on restoration of the articular surface.

Injury to the articular surface of the talar dome can often coexist with other ankle fracture patterns, or exist as isolated injuries following a traumatic event (such as osteochondritis dissecans, which Mrs. Smith suffers). Injury may vary from simple chondral contusions to complete disruption of the articular cartilage. Talar dome fractures require careful assessment of radiographs and can often be missed on initial patient assessment. Patients with a history of an acute injury, often initially diagnosed as a sprain, and who have persistent effusions, pain, locking of the ankle or crepitus on palpation during dorsi and plantar flexion, should be referred to a specialist for evaluation of a potential talar lesion.

Ankle Injuries

Table 6

Classifications of Lateral Ankle Sprains

Grade	Signs and symptoms	Ligaments Involved
I- Ligament stretch or partial tear, stable joint	Mild pain and swelling, minor functional impairment, no mechanical instability, negative anterior drawer and talar tilt tests	ATFL (stretch or partial tear), CFL (stretch)
II-Incomplete ligament tear, element of joint instability	Moderate pain and swelling, mild ecchymoses, some limitation of joint function and painful gait, evidence of moderate joint instability, positive anterior drawer test and negative talar tilt test	ATFL (incomplete tear), CFL (stretch or partial tear)
III-Complete ligament tear, unstable joint	Severe pain and swelling, significant ecchymoses, significant functional impairment, significant joint instability, positive anterior draw and talar tilt tests	ATFL (complete tear), CFL (partial to complete tear), PTFL (stretch or partial tear. Note: PTFL rarely torn.)

ATFL: Anterior Talofibular Ligament, CFL: Calcaneofibular Ligament, PTFL: Posterior Talofibular Ligament.

Take-home message

•**Taking a History:** Includes the character of the pain, ability to bear weight, recent systemic symptoms, the length of time the patient has been experiencing pain, a remote history of trauma, the mechanism of injury, whether the ankle locks or is unstable, morning ankle stiffness, and change in footwear, activity level or training methods.

•**Physical Exam:** Tests include anterior drawer, talar tilt, external rotation, squeeze, Thompson, and resisted inversion. Imaging includes radiographs, computed tomography scans, magnetic resonance imaging, bone scans, and arthroscopy.

Table 7

What are the Non-Traumatic Causes of Ankle Pain?

Osteoarthritis (OA)

- OA of the ankle can be quite debilitating. Onset is typically gradual or insidious, highlighted by increased discomfort with use, and pain reduction with rest.

Impingement Syndromes

- Impingement of soft tissues in the ankle joint leads to pain and swelling with activity, and can present as ankle instability. Referral to an orthopaedic surgeon is appropriate for impingement symptoms.

Gout

- Attacks of gout in the ankle can be heralded by acute injury, however, the pain is inconsistent with the history of the event.
- Classically, the patient presents with exquisite pain, erythema, swelling, and warmth of the affected joint, often mimicking bacterial cellulitis. Diagnosis can often be made clinically, along with elevated serum uric acid levels.[9]

What is the most common presentation of acute ankle injury?

It is estimated that 75% of ankle injuries are sprains, the majority of which involve the lateral ligament complex (Table 6). The anterior talofibular ligament is the first affected in lateral ligament sprains, with the calcaneofibular ligament also commonly involved in more severe cases. Medial ligament complex injuries, while significantly less common, can occur with eversion and dorsiflexion, and may result in avulsion fracture of the distal medial malleolus. External rotation stresses can cause syndesmosis ligament sprains, referred to as a "high ankle sprain," creating instability at the ankle joint. Syndesmosis sprains may account for as much as 11% of ankle sprains, yet may be missed unless the primary care physician is aware of their incidence.

Sprains are classified as grade I, II, or III, based on the number of ligaments involved or the extent of individual ligament compromise. Initial management of grade I and II sprains includes the "RICE" regiment of rest, ice, compression, and elevation. More controversy exists as to the appropriate management of Grade III sprains, and referral to an orthopaedic specialist is appropriate for these injuries. It is estimated 20% of patients with recurrent inversion ankle sprains will go on to experience chronic ankle instability, which may predispose the articular surface to excessive wear and early development of osteoarthritis. Non-traumatic causes of ankle pain are outlined in Table 7.

References are available on request at diagnosis@sta.ca

Practice pointer

Initial management of grade I and II sprains includes the "RICE" regimen of:

- **R**est
- **I**ce
- **C**ompression
- **E**levation

Ankle Injuries