

# ANKLE EXAMINATION

## Facilitators Guide

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Topic: **Ankle Examination**

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Duration: **Up to 1 hr**

Facilitator level **ST4+/ANP equivalent+**

Learner level **anyone working in ED, with limited injuries**

**experience: FY1+, band 5+ nurses**

Equipment required: **Computer +/- projector, or examination bench**

# OUTLINE

- Basics (10 mins) – quick review of anatomy and types of injuries; review of main examination tests (the included brief video demonstrations could be shown; otherwise you could briefly demonstrate on a model)
- Main session: (2 x 10 minute) case discussions - covering the main examination techniques, imaging, management
- Advanced session: (2 x 10 minutes) case discussions - covering specialist referral and follow-up
- Sim scenario – (30 minutes)
- Quiz (5 minutes)
- Infographic sharing (5 mins): 5 take home learning points

If unable to play videos during the session, the still images can be used.

The videos are made so that you can explain the technique while they are played (in case sound is an issue)

**Note:** this is not designed to be a teaching session on XRay interpretation, and learners can be encouraged to review basic XRay interpretation before or after the session. The tutor can choose to show some important / relevant XRays for each scenario.

## PRE-READING FOR LEARNERS

The expectation is for the learners to have watched some of the examination videos or read some of the links on anatomy and main types of injury.

[DFTB Ankle Sprains overview](#) - Good and concise overview

[DFTB Minor Ankle Injuries](#)

Ankle anatomy:

[Orthobullets page](#)

Ankle examination:

[Physio-pedia site](#)

[Stanford Medicine 25 Video for Ankle & Foot examination](#)

For a review of ankle XRay interpretation and types of ankle fractures:

[DFTB Ankle XRay interpretation](#)

[Radiopaedia Ankle Radiograph](#)

How to fit an ankle boot

[DFTB How to...fit an ankle boot video](#)

## ANKLE EXAMINATION OVERVIEW

- Know the important anatomical structures
- Palpate the relevant structures: ligaments, bones, TA...
- Depending of the severity of the sprain – more than one ligaments can be affected
- Ankle joint tests:

### To test stability:

- Anterior Drawer test – to assess ATFL integrity. Assess for pain and laxity. Should feel a firm end point. If any laxity – compare to other side
- Talar Tilt test (Forced inversion) – to assess CFL

### Other tests:

- External rotation test (Eversion test); Tib-Fib squeeze test; Cotton test – to assess Syndesmosis
- Simmond's test – to rule out Achilles tendon rupture
- Palpate talar dome
- Palpate base of 5th MT – for associated #

## Ottawa Ankle Rules - Reminder

An ankle X-Ray series is only required if there is any pain in the malleolar zone and...

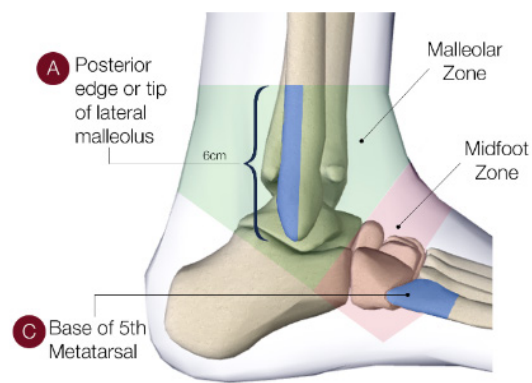
Bone tenderness at the posterior edge or tip of the lateral malleolus (A)

OR

Bone tenderness at the posterior edge or tip of the medial malleolus (B)

OR

An inability to bear weight both immediately and in the emergency department for four steps



Lateral View

A foot X-Ray series is only required if there is any pain the midfoot zone and...

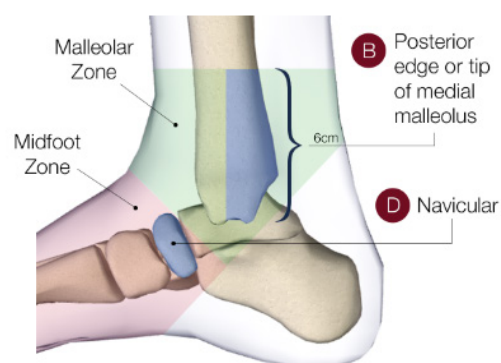
Bone tenderness at the base of the fifth metatarsal (C)

OR

Bone tenderness at the navicular (D)

OR

And inability to bear weight both immediately and in the emergency department for four steps



Medial View

## SCENARIO DISCUSSIONS

### CLINICAL SCENARIO 1

Ellen, a 15-year-old girl, presents to the Paediatric ED with her father, complaining of a painful and swollen right ankle. The nurse asks you if she should request an XRay and therefore you review her briefly in triage. The patient tells you that her ankle “twisted” and then she fell on the ground, while playing netball at school earlier on in the day. She demonstrates an inversion mechanism with her other foot. She has walked into her room, weight bearing on both feet, with a slight limp. On inspection, her ankle looks moderately oedematous. On palpation, there is tenderness in the malleolar zone, mostly anterior to the lateral malleolus. There is no bruising and no significant tenderness in the rest of the midfoot.

- 1. How do you answer the nurse’s question?**
- 2. How would you explain to Ellen and her father your rationale on requesting / not requesting an ankle XRay?**
- 3. How would you assess her injury clinically? What is the most relevant clinical ankle test, given the site of the maximum tenderness and oedema?**
- 4. If your examination does not yield any significant concerns, how will you manage Ellen? Would you give her any ankle support props?**

#### Main discussion points:

- This is mostly to trigger a discussion on XR’ing ankles.

This case is “Ottawa negative”, as the patient is weight bearing and the tenderness is anterior to the lateral malleolus. It is most suggestive of a ligament sprain (likely ATFL), which are common. Obviously, sprains don’t show on XRay. If there is no other indication, such as pain at the base of the 5th MT, or positive tib-fib squeeze test (suggestive of a syndesmosis disruption), there is no indication for an XRay.

- This needs a good clinical examination, to assess for any laxity.

The most relevant test in this scenario would be the Anterior Drawer test, assessing for ATFL integrity / sprain, but all main tests should be performed (they are quick and easy). Always have in mind that once oedema develops (especially if significant), the joint may appear stable on initial examination, even if there is significant ligament injury, and thus the tests may be falsely negative.

- This is most likely a Grade I or II sprain. These do not require immobilisation and they have better outcomes from early functional rehabilitation.
- If a Grade III sprain is suspected (significant oedema / bruising / instability), a walking boot is advised. The patient will likely require follow up (depending on the hospital's provision: Sports Clinic / Orthopaedics / Physiotherapy). A follow-up MRI or USS may be considered.
- The patient may benefit from Physiotherapy, or a Sports Clinic referral, especially if this is a recurrent injury or they are into professional sport training. Otherwise, for mild injuries, an advice leaflet / website and some explanation of exercises would be enough to keep them moving and strengthening their ankle, while improving the ROM.
- Patients that are discharged from ED without any follow-up arrangements should be told to seek referral (ideally by seeing their GP) if pain or instability persists after 7 days.

## CLINICAL SCENARIO 2

Noah is a 15-year-old boy that presents to ED stating that he has sprained his right ankle playing football in the afternoon. He is in a semi-professional football team and has had ankle sprains twice before on the same side within the last 18 months. His last injury was 6 months ago, after which he was followed up by physiotherapy. On examination, he has swelling all around his ankle and on examining him, you suspect a CFL and ATFL sprain.

**1. What tests have you performed to assess those ligaments?**

**2. How would you manage Noah now in ED? Discuss your thoughts on the immediate management, further imaging, referral, follow-up.**

### Main discussion points:

- Anterior Drawer test and Talar Tilt test are the most relevant, but a full examination should be performed
- Recurrent ankle sprains can result in chronic instability or long-term degenerative complications of the ankle and they require specialist follow-up and rehabilitation
- A phased rehabilitation programme can be found [here](#)
- The risk of a further sprain increases after each ankle sprain
- This patient requires referral and follow-up, possibly with imaging (i.e. MRI).

He requires a phased rehabilitation and return-to-sport programme.

Athletic patients benefit from bracing or taping of the affected ankle, after returning to sport following a sprain, to reduce the risk of re-sprain

- If a Grade III sprain is suspected, or there is significant swelling, the patient will benefit from a walking boot (+/- crutches) for at least 2-3 days, before starting controlled rehabilitation

## CLINICAL SCENARIO 3

Sebastian is a 13-year-old seen in A&E after injuring his right ankle during a basketball game. He landed from a jump and collided with another player, twisting his right foot. He comes with significant ankle pain on walking, and swelling around his ankle. He is tender all around the ankle, mostly so anteriorly. The tenderness extends up to the distal tibia and fibula. XRays of his ankle and tib-fib do not show any fractures.

**1. What is the main injury to be considered?**

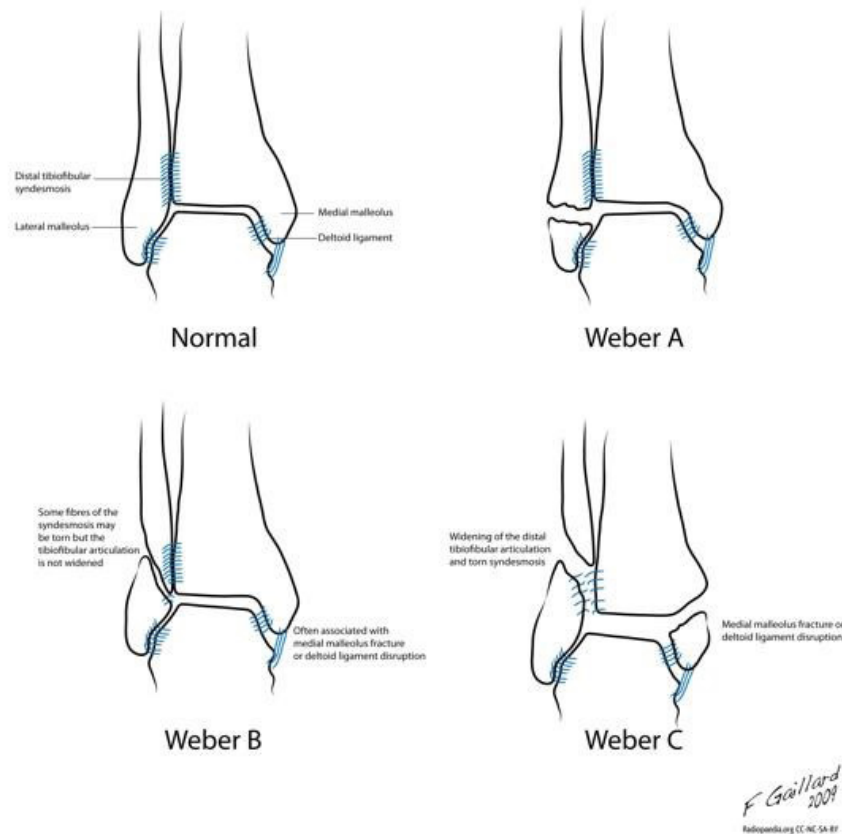
**2. How will you examine clinically?**

**3. What will you look for in the XRays?**

**4. How will you manage this kind of injury?**

### Main discussion points:

- This presentation raises concerns for a Syndesmosis injury, also called a “high ankle sprain”. The Syndesmosis maintains integrity between the distal tibia and fibular and consists of the Anterior-Inferior Tibiofibular Ligament (AITFL), the Posterior-Inferior Tibiofibular Ligament (PITFL), Interosseous Ligament (IOL), Inferior Transverse Ligament (ITL) and the Interosseous Membrane. Injuries of the syndesmosis occur mostly with external rotation of the foot.
- Clinical suspicion is raised by palpating the syndesmosis area (anteriorly and anterolaterally). Perform the relevant provocative tests: Squeeze test, External rotation test, Cotton test and Fibular translation test. Most have moderate accuracy, and should be interpreted in combination with the site of tenderness and the mechanism of injury.
- This type of injury can be associated with ankle or tib/fib fractures – Know the Weber classification of ankle fractures (check this for a revision). You may want to show this diagram at this point of the discussion during your session:



(Reproduced from <https://radiopaedia.org>)

- It can be difficult to diagnose a syndesmosis injury on XRay. Ideally, an AP, lateral and mortise view images are required. Stress XRays may be considered. XRay findings can be:

- decreased tibiofibular overlap  
normal >6 mm on AP view  
normal >1 mm on mortise view
- increased medial clear space  
normal less than or equal to 4 mm
- increased tibiofibular clear space  
normal <6 mm on both AP and mortise views

- These injuries require referral to orthopaedics and follow up. A CT or MRI can be done, particularly if there is clinical suspicion with no XRay findings, and they have higher diagnostic accuracy.

- The patient will need a boot or cast, non-weight bearing, for 2-3 weeks, followed by physiotherapy and phased return to sport. They generally take longer to heal than lateral ankle sprains. If there is instability, or associated fracture, or persistent of symptoms after conservative management, surgical fixation may be indicated.

- [Orthobullets High Ankle Sprains](#) – Excellent page with helpful images



## CLINICAL SCENARIO 4

You have seen Ria in A&E, a 12 year old aspiring gymnast. She had an inversion injury of her right ankle during gymnastics, by landing awkwardly from the vault. Since then she has significant pain on walking. She is mostly tender on the base of the 5th metatarsal, and therefore you request foot X Rays. You review the images and don't think there is a fracture. Due to the significant pain, you advise analgesia and give her a walking shoe for a few days.

Next week, you get the dreaded email from your Clinical Lead Consultant, informing you that her X Ray was reported by the radiologist as a "pseudo-Jones" fracture. Your consultant informs you that it is not the first time that this kind of fracture gets missed in your department, and suggests that you read on this and deliver a short departmental teaching for everyone's learning.

- 1. What is a pseudo-Jones fracture? And what is the difference with the actual Jones fracture? (who is Jones, anyway? :)**
- 2. Why do you think the fracture was missed on the first instance?**
- 3. How would you manage Ria now?**

### Main discussion points:

- Fractures of the base of the 5th MT usually occur after an ankle inversion injury, therefore they need to be considered and examined in any patient presenting with an ankle injury
- Most fractures of the base of the 5th MT are avulsion fractures of the 5th MT styloid, also called pseudo-Jones fractures. The fracture line on X Rays appears perpendicular to the plane of the MT bone, which is characteristic and should always raise concerns (if there is associated pain in the area and a relevant mechanism of injury). The X Ray appearance is often confused for the normal apophysis of the 5th MT, which however should lie laterally and longitudinally to the shaft. They could also be confused for normal accessory foot ossicles (os vesalianum and os peroneum).
- Jones fractures are fractures at the metaphysis-diaphysis junction, at the level of the fourth-fifth intermetatarsal articulation. They require referral and follow-up, as there is a risk of non-union and need for surgical intervention

- Treatment is usually non-operative. The patient requires a walking shoe or boot (or a cast) for about 6 weeks. They can return to sport and normal activities after this period, once they are pain free with normal movement and ROM of the foot and ankle.

- Radiopaedia.org have good images and brief explanations of radiographic findings

<https://radiopaedia.org/articles/avulsion-fracture-of-the-5th-metatarsal-styloid?lang=gb>

<https://radiopaedia.org/articles/apophysis-of-the-proximal-5th-metatarsal?lang=gb>

<https://radiopaedia.org/articles/os-vesalianum-foot?lang=gb>

- This patient (like all cases of missed fractures) will need to be contacted to ask about symptoms and activity. You need to liaise with the orthopaedic team to arrange a review and follow up.

## QUIZ

### Question 1.

**Regarding ankle injuries in children and young people, which statement is NOT correct:**

- A:** Lateral ankle sprains are the commonest types of injury
- B:** Ligament sprains are commoner in younger children
- C:** Tenderness in the midfoot area and inability to weight bear is an indication for X Rays
- D:** Most patients with ankle sprains can mobilise early on after the injury

**Answer:**

Ankle sprains have a peak incidence in the adolescent ages. In young children, these kinds of injuries are more likely to lead to a bony fracture than a ligament injury, because growth plates are generally weaker than ligaments in young children.

### Question 2.

**Regarding Grade III ankle sprains, which statement is correct:**

- |  |   |
|--|---|
| <b>A:</b> Are unlikely to recur                        | <b>C:</b> Usually require an MRI or USS                   |
| <b>B:</b> Require early mobilisation and physiotherapy | <b>D:</b> The PTFL is the most commonly affected ligament |

**Answer:**

Severe ankle sprains predispose to further ankle injuries with incidence of re-injury increasing with the number of previous injuries.

In grade I and II lateral ankle sprains early mobilisation is generally indicated, whereas for grade III a period of immobilisation is recommended.

The ATFL is the most commonly affected ligament. The PTFL is the strongest lateral ankle ligament.

### Question 3

Regarding imaging in ankle injuries, which statement is NOT correct:

**A:** The Ottawa Ankle Rules are not a very accurate tool for use in young patients

**B:** Fractures of the base of the 5th metatarsal can often be missed on XRays

**C:** Syndesmosis injuries can be difficult to diagnose on routine XRays

**D:** MRI is the preferred mode of imaging for suspected ligament ruptures

**Answer:**

Studies have shown that the OARs are a valid tool for use in children and YP, mostly for avoiding unnecessary XRays (high sensitivity = SnNOut = “Rule out” test: If OARs negative, very unlikely to have a fracture)

## Question 4

Regarding ankle fractures in children, which statement is NOT correct:

A: Salter-Harris I malleolar fractures are easily missed

B: Missed Salter-Harris I fibular fractures often lead to long-term compromise of the affected joint

C: Further XRay views may be required for some fractures to be identified

D: Ankle fractures can be classified in the “Weber classification system”

### Answer:

Salter-Harris fractures of the distal tibia or fibula are very common and easily missed or presumed to be sprains.

Non-displaced S-H I fractures of the fibula rarely lead to long-term compromise, even if missed.

## Take-home messages

- 1 Not all ankle injuries require X Rays. Remember the Ottawa Ankle Rules.
- 2 Perform the main ankle examination tests in all ankle injuries
  - don't forget to examine the base of the 5<sup>th</sup> metatarsal
  - more specific tests may be required depending on the findings
- 3 Remember that significant oedema may give the false impression of a stable ankle
- 4 Ankle sprains are the commonest injuries:  
Grades I–III
- 5 Most sprains can return to gentle movement straightaway
  - some require graded rehabilitation
  - know who to refer to, if required
- 6 Know the basics of ankle fractures
  - you can use a cheat sheet [Radiopaedia Ankle Radiograph](#)

## REFERENCES

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