

Orthopaedics Lower Limb

1. A 23 year old male arrives in the ED having injured his left ankle whilst playing rugby earlier in the day.
 - a) What are three indications for plain film radiography as described by the Ottawa Ankle Rule?
 - Bone tenderness at the posterior edge/tip of the lateral malleolus
 - Bone tenderness at the posterior edge of tip of the medial malleolus
 - An inability to weight bear both immediately and in the emergency department for four steps
 - b) In addition, what are the three indications for plain film radiography of the foot as per the Ottawa foot rules?
 - Bone tenderness at the base of the fifth metatarsal
 - Bone tenderness at the navicular
 - Inability to weight bear both immediately and in the emergency department

XRays are performed and shown below.



c) Describe the two most important abnormalities identified on the xrays

Pilon fracture – type 1 as minimal displacement

Diastasis of the inferior tibiofibular joint

d) List four injuries most associated with falls from height when landing feet-first

- Calcaneus fracture
- Vertical shear pelvic fracture
- Thoracolumbar fractures
- Retroperitoneal injuries
- Intracranial injuries

2. 35 year old man has re-presented to the ED with a painful left foot. He was seen two days earlier in your ED after falling off a skateboard. He was discharged with the diagnosis of 'ankle sprain' and advised too weight bear as tolerated. His xray is provided below



a) What is the injury that is demonstrated on the xray?

- Lis franc injury – widening of the space between the 1st and 2nd metatarsal bone

b) List three complications of this injury

- Compartment syndrome of the foot
- Early osteoarthritis and non-union/loss of function
- Lateral dislocation of the midfoot

You explain the missed diagnosis to the patient and provide reassurance to them that you will perform a root cause analysis as part of your management.

c) Complete the following table listing potential causes of this error and provide a solution for each

Category	Cause	Solution
System Issues Structure ie staffing/work areas/specialty support	Inadequate senior staff	Improve staff numbers to help supervision
	Lack of timely radiology review	Raise issue at radiology M+M and benchmark against other sites
Process Issues Workflow/supervision/rostering	No policy regarding senior review prior to discharge	Identify stakeholders and develop policy mandating senior sign off prior to dc
	Lack of formal radiology education sessions for junior medical staff	Develop teaching programme in collaboration with radiology services
Individual Issues Junior doctor specific issues	Performance issue with JMO involved	Discuss with JMO supervisor, welfare concern for JMO involved
	Not following, or not aware of local policy and procedures regarding patient discharge process and senior medical review	Update JMOs on policy

3. A 23 year old male presents to ED after a soccer injury. His xray reveals a fractured right tibia and fibula that requires operative fixation. He has a long leg back slab in situ and begins to complain of increasing pain despite opiate analgesia. You are suspicious for compartment syndrome.

a) What are the clinical features on examination most suggestive of compartment syndrome

- Pain on passive movement of the muscles passing through the affected compartment
- Tenderness over the affected compartment
- Venous congestion

b) Other than fracture, list five causes of compartment syndrome

- Crush injury
- Burns
- Excessive exertion
- Prolonged immobilisation
- Seizures
- Haematoma
- Soft tissue infection, eg necrotising fasciitis
- Extravasation of intravenous fluid/contrast dye

c) What are the two most commonly affected compartments in compartment syndrome?

- Volar compartment of the forearm
- Anterior compartment of the leg

d) List five important steps in your initial management

- Elevate the limb to the level of the heart
- Analgesia, eg 0.1mg/kg morphine
- Removal of plaster cast
- Adequately fluid resuscitate in order to prevent AKI from rhabdomyolysis
- Immediate discussion with orthopaedic service to facilitate fasciotomy

e) List three complications of compartment syndrome

- Ischaemia causing gangrenous necrosis
- Ischaemic contracture
- Rhabdomyolysis