Fracture Management

General Advice

This guide gives brief advice about the management of common fractures presenting to ED. Where there is uncertainty, discuss cases with senior medical staff or consult the variety of orthopaedic and emergency medicine textbooks available in ED.There is a fracture clinic held Monday-Friday at RAH and IRH
Emergency referral of all orthopaedic cases should be made to the orthopaedic FY2 at RAH and the on call orthopaedic registrar at IRH.

Paediatric fractures requiring emergency orthopaedic discussion and assessment should be discussed with senior doctors. Sometimes it is appropriate to refer directly to the ortho registrar at RHC if requiring manipulation / operative treatment. Generally we do not sedate children for fracture manipulation in ED. Non-operative cases can be referred to the local orthopaedic receiving team.

In general terms, fractures can be categorised in four ways:

Fracture Type	Features	Examples
DISCHARGABLE	Some fractures can be discharged from ED with appropriate advice. Advice leaflets are available on CEM website for these cases	Little metacarpal # 5th Metatarsal # Radial head #
VFC REFERRAL	Fractures requiring POP cast or specific orthopaedic review. Patients should be given follow-up advice for the VIRTUAL FRACTURE CLINIC	Colles # Lateral maeollus # Fibula neck #
EMERGENCY REFERRAL	Fractures requiring discussion with and advice from the receiving orthopaedic service to determine on-going management	Neck of femur # Ankle # with talar shift Tibial plateau #
SOCIAL REFERRAL	Fractures which result in significant functional impairment for the patient sufficient to preclude them from managing at home	Pubic ramus # Neck of humerus #

Virtual Fracture Clinic (VFC)

Patients requiring referral to the virtual fracture clinic should be provided with a VFC advice leaflet and they should then make an appointment at reception prior to leaving.

Virtual fracture clinic discharge checklist

1. Patient has adequate analgesia prescribed
2. Appropriate initial treatment (splintage/cast/sling) has been given
3. Patient has telephone contact details
4. Patient provided with VFC leaflet (on CEM)
5. Patient makes a VFC appointment at reception
6. Patient understands that they will be contacted the following working day

Examination Tips

There are some key points to remember during the clinical examination of all patients presenting with a fracture.

LOOK

- Comment on obvious deformity
- Assess for adequate local skin perfusion/discolouration

FEEL

- Assess distal circulation
- Assess for distal sensory function
- Feel for local crepitus

MOVE

- Move the joint above and below the injury
- Comment on both active and passive movement

ADDITIONAL

- Upper Limb Injures- Ask about HAND DOMINANCE and occupation
- Lower Limb Injuries- Document weight bearing ability

X-rays

- NEVER request an x-ray prior to examining the patient
- Request the CORRECT x-rays- it is unfair to assume the radiographer will know which x-rays are required- they have not examined the patient
- Certain injuries require SPECIFIC VEIWS- these are discussed during the description of the relevant injury- in the event of uncertainty- ask before sending the patient to x-ray
- In most cases- TWO views are required. Where a single view is acceptable- this is described in the context of the relevant injury.

  As a guide:
  TWO VIEWS- AP and Lateral
  TWO JOINTS- Above and below the injury in long bone fractures

Open Fractures

Management of open fractures is as follows:

- Irrigate wound with saline
- Saline soak dressing
- IV Antibiotics- 1.5g IV Cefuroxime
- Assess tetanus status
- Appropriate fracture management (POP/Splint)
- Refer to on-call orthopaedics

Upper Limb Injuries

Sterno-Clavicular Joint Dislocation

Diagnosis made on CHEST X-RAY. Assess for joint asymmetery.
Clinical examination used to differentiate type of dislocation.

Anterior Dislocation
Clavicle is more prominent on palpation over the anterior chest wall
Manage with a broad arm sling and fracture clinic follow-up
Posterior Dislocation
There is a palpable depression on the anterior chest wall
Perform ECG
Refer to on-call orthopaedics.

Clavicle Fracture

In suspected clavicle fractures, request a CLAVICLE X-RAY. One view is adequate
Typically, the fracture is found in the middle third

DISCHARGE CHECKLIST

- ✓ Assess for skin tenting (if present refer to orthopaedics)
- ✓ Assess upper limb neurovascular status
- ✓ Broad arm sling
- ✓ Ensure appropriate analgesia
- ✓ Ensure safety for discharge
- ✓ VFC

Acromio-Clavicular (AC) Joint

If AC joint injury is suspected, X-rays of BOTH AC joints are required for comparison.

GRADE	FEATURES	MANAGEMENT
I	No asymmetry on x-ray. Clinical diagnosis	Broad-Arm sling for 2-3 days Adequate analgesia EARLY MOBILISATION Discharge to GP
II	Subluxation on x-ray Joint capsule remains intact	Broad-Arm sling for 2-3 days Adequate analgesia EARLY MOBILISATION Discharge to GP
III	AC and coracoclavicular ligaments torn Joint capsule disrupted	May require weight bearing views Broad-arm sling Refer to fracture clinic

Scapula Fractures

Request SCAPULA X-RAY
Common injury in frail elderly patients
An isolated fracture of the scapula is uncommon and is often associated with chest wall injury and underlying pulmonary trauma

Assess and document WINGING of the scapula- This is caused by an injury to serratus anterior and requires out-patient orthopaedic follow-up

DISCHARGE CHECKLIST

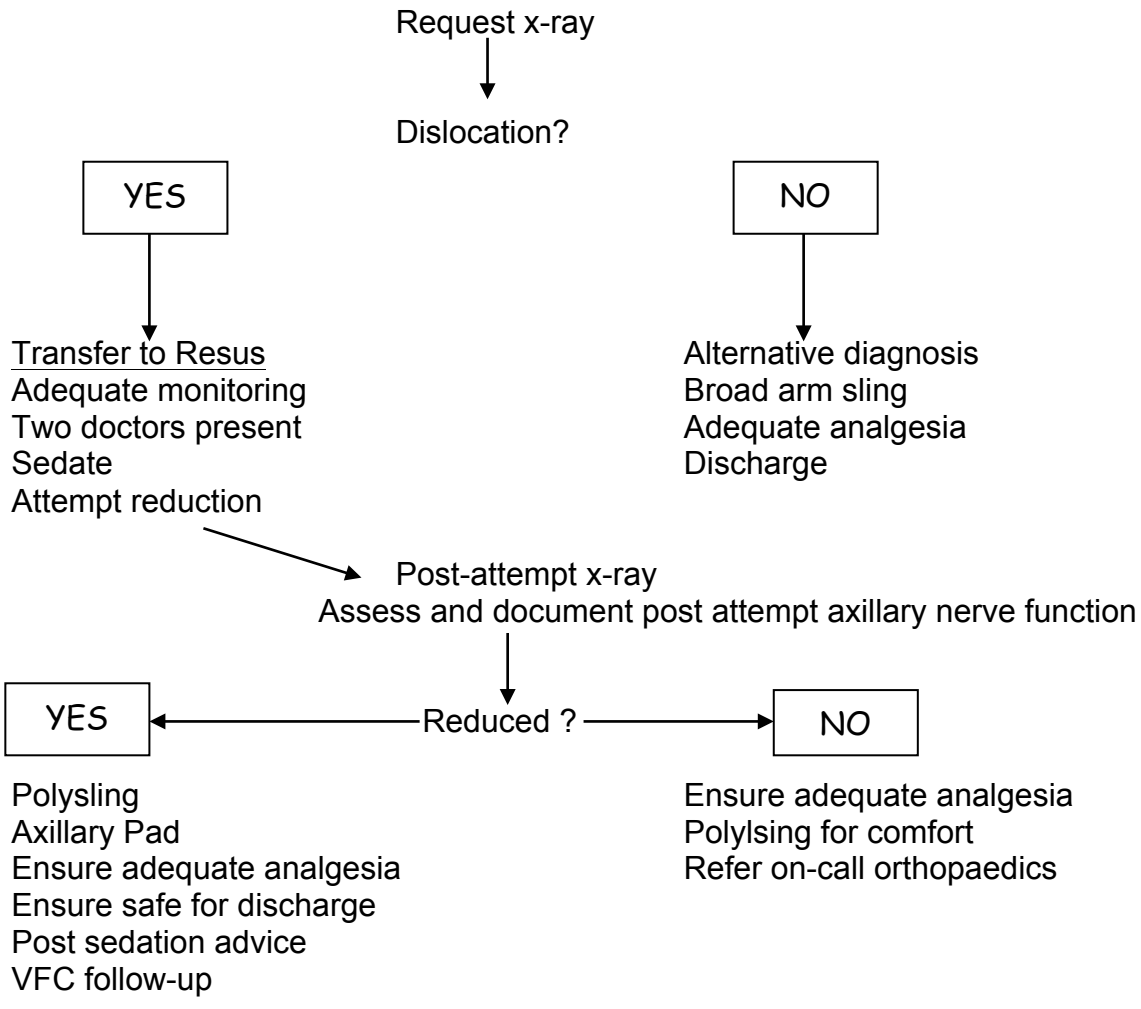
- ✓ Satisfactory respiratory observations and examination
- ✓ Broad arm sling
- ✓ Ensure adequate analgesia
- ✓ VFC

Anterior Shoulder Dislocation

One view (AP) is satisfactory to diagnose anterior shoulder dislocation

Management of suspected shoulder dislocation:
IV Access

- IV Morphine
- Assess and Document Axillary Nerve Function (badge patch)



Anterior Shoulder Dislocation with associated fracture

Anterior shoulder dislocation often associated with a fracture of the greater tuberosity of the humerus

Fracture Site	Action Required
Undisplaced greater tuberosity fracture	Attempt reduction
Greater tuberosity fracture displaced >1cm	Refer to on-call orthopaedics Do not attempt reduction
Fracture neck of humerus	Refer to on-call orthopaedics Do not attempt reduction

Posterior Shoulder Dislocation

Uncommon diagnosis- 1:20 of shoulder dislocations
Associated with seizure and electrocution

Clinical features

- Arm held in internal rotation
- Reduced active external rotation
- Assess and document axillary nerve function

X-ray findings

- AP View is often normal
- Assess for “light-bulb” sign on AP view
- Easier to diagnose on “Y”-View

Management

- Attempt reduction in ED
- If successfully reduced- give polysling and ensure adequate analgesia.
- VFC

If reduction unsuccessful- refer to on-call orthopaedics

Neck of Humerus Fracture

Common injury in elderly patients with underlying degenerative bone disease
Request a HUMERUS X-RAY

DISCHARGE CHECKLIST

- ✓ Assess and document upper limb neurovascular status
- ✓ Ensure adequate analgesia
- ✓ Ensure suitable for discharge
- ✓ Collar and cuff
- ✓ VFC

Shaft of Humerus Fracture

Usually associated with a rotational injury (such as arm-wrestling)
Common in metastatic bone disease
Request a HUMERUS x-ray

Examination

Significant deformity
Assess and document radial nerve function (active wrist extension and sensation in the web-space between thumb and index finger)

Management

Type of Fracture	Management
Two-Part	Humeral brace Post application x-ray Adequate analgesia Fracture clinic- next clinic
Three or More Parts	Humeral brace Post application x-ray Adequate analgesia Refer to on-call orthopaedics

Elbow and Forearm Injuries

Elbow Dislocation

Clinical Features

- Gross deformity
- Loss of characteristic “triangular” appearance over posterior aspect of elbow
- Assess and document distal neurological function (Beware MEDIAN nerve)

NERVE	MOTOR FUNCTION	SENSORY FUNCTION
MEDIAN	Thenar Eminence of thumb Adduction on MCPJ Flexion of MPCJ Opposition	Radial border of index finger
RADIAL	Active wrist extension	Web-space between thumb and index finger
ULNAR	Intrinsic hand muscles- abduction and adduction of MCPJ	Ulnar border of little finger

- Assess and document distal vascular function
- IV Access and IV morphine prior to x-ray
- Immobilise in broad-arm sling

X-Ray Findings

- Request ELBOW X-RAY
- Usually olecranon dislocates posteriorly
- Assess for associated fracture- especially radial head/neck and coronoid process

In case of fracture-dislocation- refer to orthopaedics, DO NOT attempt reduction in ED. There is a significant danger of ingress of fracture fragments into the joint.

Management

- Transfer to resus
- Adequate monitoring
- Consent for procedural sedation
- Two doctors present
- Sedate
- Reduce- usually with longitudinal traction and slight flexion
- Assess and document distal neurological function post-reduction
- Long-arm backslab (apply BEFORE post reduction x-ray as reduced joint is often unstable)
- Post-reduction x-ray
- Refer to on-call orthopaedics.

Even if reduced- patients are often admitted for elevation and circulation, sensation and movement check as there is a significant incidence of neurological deficit associated with swelling.

Distal Humerus Fracture

Clinical Features

- Not generally associated with gross deformity
- Reduction in active elbow movement- especially reduced flexion
- Assess and document distal neurological function
- Assess and document distal vascular function

Fractures may be SUPRACONDYLAR or INTRA-ARTICULAR

X-ray findings
Fractures can be subtle.
Supracondylar fractures are seen on the lateral elbow view

ANTERIOR HUMERAL LINE

Draw a straight line down the anterior aspect of the distal third on the humerus
At least ONE-THIRD of the capitellum must lie IN FRONT of this line

An abnormal anterior humeral line indicates posterior angulation of a supra-condylar fracture

Management

- Ensure adequate analgesia
- Long-arm backslab
- Check neurological and vascular status post backslab application
- Refer to on-call orthopaedics

BEWARE

Supra-condylar fractures are associated with BRACHIAL ARTERY injury

Arterial Occlusion results in VOLKMANN's CONTRACTURE resulting in necrosis of forearm tissue

Assess and document
BRACHIAL PULSE
RADIAL PULSE
ULNAR PULSE

Olecranon Fracture

Clinical Features

- Gross deformity
- Palpable "gap" over the olecranon
- Loss of triceps function- unable to actively extend elbow
- Assess and document distal neurological function
- Assess and document distal vascular function

X-ray Findings

- Request ELBOW X-ray
- Obvious gap in olecranon best seen on LATERAL view

Management

- Ensure adequate analgesia
- Long arm back-slab and broad arm sling
- Refer to on-call orthopaedics

Olecranon fractures are generally operatively repaired using a tension band wire as there is a significant association with functional impairment and non-union

Radial Head/Neck Fractures

Often result from a fall onto an out-stretched hand

Clinical Features

- Not commonly associated with deformity
- Flexion and extension and usually preserved
- Reduced pronaiton and supination of the hand
- Assess and document distal neurological function
- Assess and document distal vascular function

X-Ray Findings

- Radial neck fractures are best seen on LATERAL view
- Radial head fractures are best seen on AP view

RADIAL-CAPITELLAR LINE

On the lateral x-ray a line drawn through the middle of the shaft of the radius must pass through the capitellum

Disruption of this line indicates dislocation of the proximal radio-ulnar joint.

Management

Type of Fracture	Initial Management	Follow-Up
Radial head- <33% of articular surface	Broad arm sling Adequate analgesia	Discharge Advice leaflet form CEM website EARLY MOBILISAITON
Radial head- greater than 33% of articular surface	Broad arm sling Adequate analgesia	Virtual Fracture Clinic follow-up
Radial neck- less than 15° angulation	Broad arm sling Adequate analgesia	Discharge Advice leaflet form CEM website EARLY MOBILISAITON
Radial neck- greater than 15° angulation	Broad Arm Sling Adequate analgesia	Virtual Fracture Clinic follow-up

Joint Effusion

Patients with clinical findings consistent with a radial head fracture who do not have an obvious fracture on x-ray but have evidence of joint effusion ("fat-pads") on their x-ray should be managed with:

- Adequate analgesia
- Broad Arm Sling
- Advice leaflet from CEM website

FAT PADS

"Fat-Pads" are seen on lateral elbow x-ray.

An anterior fat pad can be a normal variant but if elevated ("sail-sign") this is more suggestive of an intra-articular fracture

Posterior fat pads are always pathological

Forearm Fractures

Two eponymous fractures of the forearm exist.
The forearm is a ring structure so will often disrupt in more than one place.

Clinical Findings

- Deformity of forearm
- Reduction in active range of elbow and/or wrist movement
- Assess and document distal neurological function
- Assess and document distal vascular function

X-Ray Findings

- Request RADIUS and ULNA x-ray
- If suspicious on MONTEGGIA fracture/dislocation (see below) may need dedicated LATERAL elbow view

FACTURE NAME	X-RAY FINDINGS	INITIAL MANAGEMENT	FOLLOW-UP
MONTEGGIA	Fracture of ulnar shaft and dislocation of proximal radial-ulnar joint (Abnormal radial-capitellar line)	Adequate analgesia Longarm backslab Broad Arm Sling	Refer to on-call orthopaedics
GALEAZZI	Fracture of radius with dislocation of distal radial-ulnar joint	Adequate analgesia Longarm backslab Broad Arm Sling	Refer to on-call orthopaedics

Shaft of Ulna Fracture

Typically affects the middle third of the ulna
“Night-stick” fracture- resulting from a direct blow on the forearm when the patient raises their arm to protect their face

Clinical Features

- Forearm deformity
- Palpable step and/or crepitus over ulnar aspect of forearm
- Assess and document distal neurovascular function- especially ULNAR NERVE

X-Ray Findings

- Request RADIUS and ULNA x-ray
- Pay particular attention to the LATERAL elbow x-ray and the RADIAL-CAPITELLAR line. Fracture of the ulna is often associated with a MONTEGGIA fracture

Management

- Ensure adequate analgesia
- Long-arm back-slab
- Broad arm sling
- VFC

Wrist Injures

Colles Fracture

Typically follows a fall on an out-stretched hand
Common in elderly patients with associated degenerative bone disease

Clinical Features

Deformity- typically described as “dinner-fork” with swelling to the dorsal surface of the wrist
Assess for distal neurological function- especially MEDIAN NERVE

NERVE	MOTOR FUNCTION	SENSORY FUNCTION
MEDIAN	Thenar Eminence of thumb Adduction on MCPJ Flexion of MPCJ Opposition	Radial border of index finger
RADIAL	Active wrist extension	Web-space between thumb and index finger
ULNAR	Intrinsic hand muscles- abduction and adduction of MCPJ	Ulnar border of little finger

Assess for distal vascular function

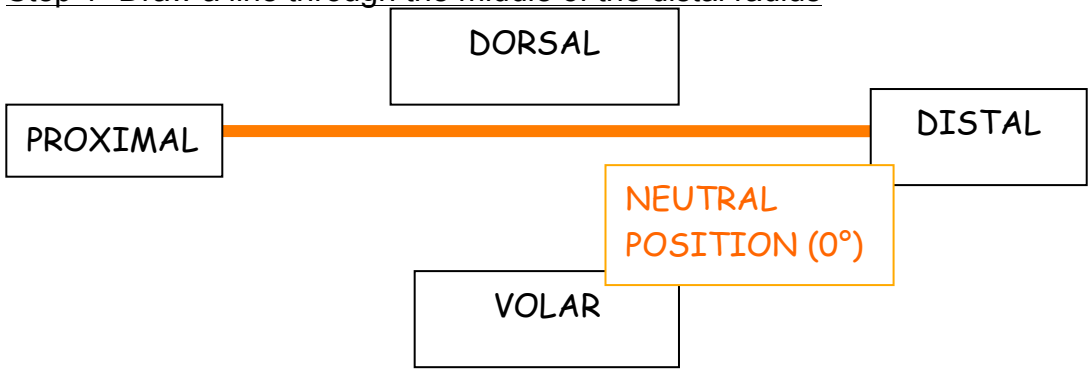
X-Ray Findings

Fracture of the distal radius with dorsal angulation of the distal fragment.
When assessing the x-ray comment on:

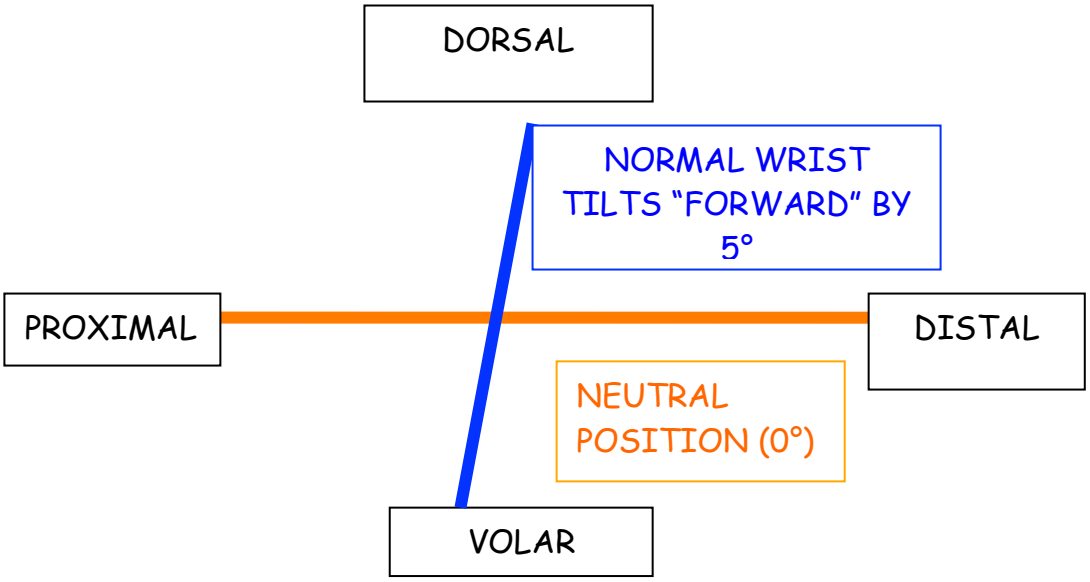
Fracture Feature	X-ray to Review	Clinical features
IMPACTION	AP View	Radial styloid should be 1cm distal to ulnar styloid
ANGULAITON	Lateral View	In the NORMAL x-ray the joint line tips forward by 5°.

Assessing Angulation

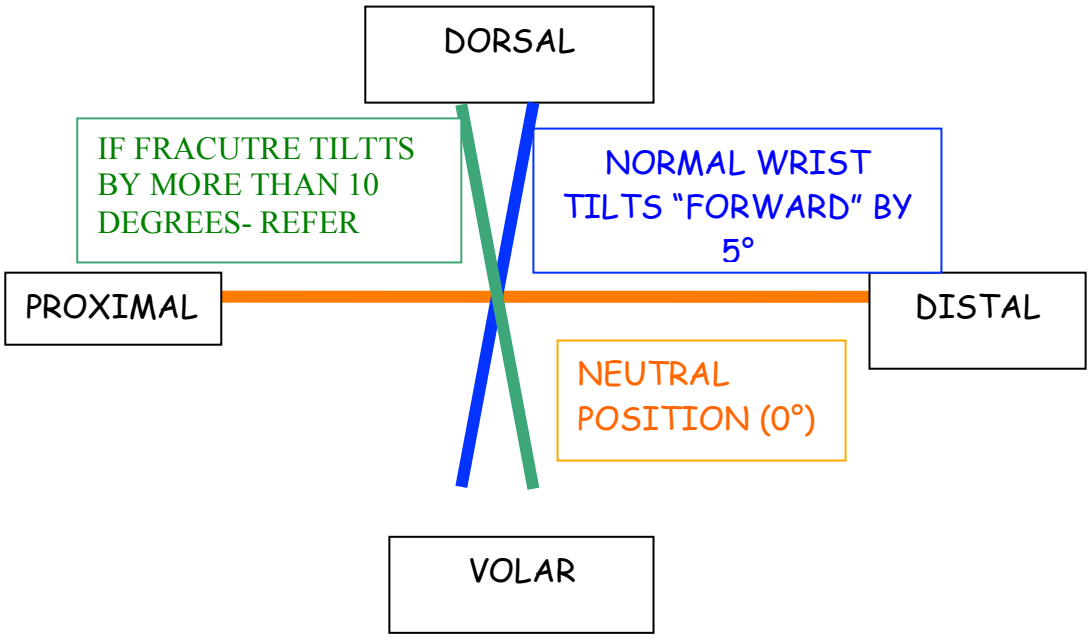
Step 1- Draw a line through the middle of the distal radius



Step 2- Draw a line across the articular surface of the distal radius- this line will normally tip "forward" by five degrees



Step Three- If the fracture angulated by more than 15 degrees (so tilts "backwards" by 10 degrees it will require manipulation



Management
- Ensure adequate analgesia
- Apply wrist splint
- Broad arm sling
- Patients NOT requiring manipulation should be referred to the virtual fracture clinic

Indications for manipulation
1. Displacement of ulnar styloid
2. Impaction resulting in radial styloid being less than 1cm distal to ulnar styloid
3. Angulation where joint line tips backwards by greater than 10° (15° from normal position)
4. Distal neurological deficit on examination

Colles fractures are manipulated to preserve function. The threshold for manipulation is patient dependent. Patients who are unfit for GA can have their fracture manipulated under procedural sedation. All patients requiring manipulation should be referred to the on-call orthopaedic service.

Smith's Fracture

Sometimes called a "Reverse" Colles
Fracture of distal radius with volar angulation of the distal fragment

Clinical Features
Fall onto a flexed wrist, clinical deformity
Assess distal neurological function especially MEDIAN nerve

X-ray Findings
Lateral x-ray shows a fracture with VOLAR angulation of the distal fragment.
Management
These are inherently unstable injuries and require referral to the on-call orthopaedic service
Elevate and apply a Colles backslab

Barton's Fracture

Intra-articular fracture of the distal radius
Volar angulation of the distal fragment
Clinically unstable
Refer to on-call orthopaedics

Scaphoid Injury

The scaphoid is one of the carpal bones, situated on the proximal of the two rows of the carpal bones and found on the radial aspect of the wrist.

The scaphoid id palpated in the "Anatomical Snuff Box"- ASB- An area found at the base of the thumb metacarpal and bordered by the tendons of:
- Extensor Pollicus Longus
- Abductor Pollicus Longus/Extensor Pollicus Brevis

Scaphoid fractures are associated with avascular necrosis owing to the nutrient blood supply entering the bone distally.
The scaphoid comprises:

- Proximal Pole (site of avascular necrosis)
- Waist (commonest site of fracture)
- Distal Pole

The distal pole of the scaphoid forms part of the articular surface of the wrist. Avascular necrosis of the proximal pole predisposes the patient to chronic wrist pain, stiffness and limitation of function

Clinical Features

- Fall onto an outstretched hand
- Tender over anatomical snuff box
- Tender at base of thumb when thumb is “telescoped” (pulled out to length)
- Tender to palpate scaphoid- especially on volar aspect of wrist
- Assess for distal neurological and vascular function

X-Ray Findings

- Request SCAPHOID views
- Fractures are most commonly seen on the waist of the scaphoid
- It is comparatively to see scaphoid fractures on initial x-rays

BEWARE
Scaphoid views should ONLY be requested where there is a clinical suspicion of a scaphoid injury.
Negative x-rays require the patient to have their wrist immobilised and follow-up

Management of Scaphoid Injuries

X-RAY FINDINGS	INITIAL MANAGEMENT	FOLLOW-UP
SCAPHOID FRACUTRE	Splint- NO thumb extension Broad Arm Sling Adequate analgesia	Refer to virtual fracture clinic
NO FRACTURE SEEN	Adequate analgesia Wrist splint Broad Arm Sling	Refer to virtual fracture clinic

Perilunate Dislocation

Often missed on lateral x-ray- suspect in high energy injuries with a normal x-ray

Clinical Features

- Deformity of dorsal surface of wrist
- Absent extension
- Assess for neurological and vascular status

X-Ray Findings

Easiest seen on LATERAL x-ray. A straight line drawn on the lateral x-ray should pass through all three structures

Look for alignment of:

DISTAL RADIUS ARTICUALAR SURFACE (Saucer)
LUNATE (Cup)
CAPITATE (Apple)

Management

- Colles backslab
- Refer to on-call ortho for MUA
-

Hand Fractures

- Hand fractures are managed symptomatically with the priority being on the maintenance and early restoration of function.
- Comprehensive assessment is necessary to ensure that functional status is preserved and injuries where function may be compromised are identified and appropriately treated
- In general terms, hands should be immobilised for the least duration possible as prolonged splintage encourages stiffness and limits function
- It is of paramount importance that hand injuries are ELEVATED. This will reduce swelling and encourage early mobilisation thereby facilitating early restoration of function

Documentation

- DOMINANCE must be documented (which hand the patient writes with)
- OCCUPTION should be documented

Hand Examination

Hand surfaces are described as PALMAR and DORSAL
The borders of the hand are RADIAL and ULNAR
Digits have names: THUMB, INDEX, MIDDLE, RING, LITTLE

Neurological Examination

NERVE	MOTOR FUNCTION	SENSORY FUNCTION
MEDIAN	Thenar Eminence of thumb Adduction on MCPJ Flexion of MPCJ Opposition	Radial border of index finger
RADIAL	Active wrist extension	Web-space between thumb and index finger
ULNAR	Intrinsic hand muscles- abduction and adduction of MCPJ	Ulnar border of little finger

Digital nerves are examined by assessing sensation of the RADIAL and ULNAR border of each finger.

Hand X-Rays

If the palmar surface of the hand is injured then HAND X-RAY should be requested.
For finger injuries a dedicated FINGER X-RAY of each affected digit is necessary (even if this means 5 separate films)
For metacarpal injuries a LATERAL HAND X-RAY is required

Thumb Metacarpal Fracture

These are generally unstable and associated with significant functional impairment

Suspected thumb metacarpal fracture

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Assess sensation to RADIAL and ULNAR border of thumb

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Analgesia and high elevation sling

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Request thumb x-ray

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FRACTURE?

YES

Apply BENNETT'S cast
High Elevation Sling
Adequate Analgesia
Virtual fracture clinic

NO

Wrist Splint with
Thumb Extension
Adequate analgesia
Early mobilisation
Ensure no UCL injury

BEWARE
BENETT'S FRACUTRE

Intra-articular thumb metacarpal fracture involving the carpo-metacarpal joint

- Apply Bennett's Cast
- High Elevation Sling
- REFER ON-CALL ORTHOPAEDICS

Metacarpal Shaft Fracture- Index-Little fingers

Patients with a metacarpal shaft fracture require a LATERAL HAND X-RAY to assess the degree of angulation

Often the radiographer will provide this view when they identify this injury on the AP or oblique x-ray but you must ensure that it has been taken prior to discharging patient

Index/Middle/Ring/ Little Metacarpal Shaft Fracture

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Ensure True Lateral Hand X-ray

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Angulation greater than 20°

YES

Volar Slab and Buddy Strap affected fingers
High elevation sling
Adequate Analgesia
ON-CALL ORTHO

NO

Buddy Strap affected fingers
High elevation sling
Adequate Analgesia
VFC

Boxer's Fracture

This is a fracture of the little metacarpal neck- often associated with a punch injury
It is essential to examine for and document ROTATIONAL DEFORMITY

ASSESSING ROTATIONAL DEFORMITY

Ask the patient to make a fist
Ensure that none of the fingers overlap or turn under each other
DOCUMENT your findings as

NO ROTATIONAL DEFORMITY
ROTATIONAL DEFORITY OF xxxx FINGER

Rotational deformity requires ORTHOPAEDIC REFERRAL- Angulation will often correct with remodelling- rotational deformity NEVER will correct

Little finger metacarpal neck fracture on x-ray

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Rotational Deformity

YES

Buddy strap ring and little fingers
High elevation sling
Adequate analgesia
REFER ON-CALL ORTHO

NO

Buddy strap little and ring fingers- 2-4 WEEKS
High elevation sling
Adequate analgesia
Early Mobilisation
Discharge advice leaflet

BEWARE

Boxer's fractures are often associated with a wound found on the dorsal surface of the hand over the little MCPJ
You must ask explicitly if this injury was caused by punching a third party in the mouth (patients are sometimes reluctant to admit this stating for example that they "punched a wall")

If this was sustained by punching a third party in the mouth- a "fight bite" injury

1. Infiltrate would with local anaesthetic
2. Scrub and irrigate wound
3. Prophylactic antibiotics- CO-AMOXICAV 375mg tid
4. BBV Screening- Often need accelerated Hepatitis B Vaccine Course
5. Ask about tetanus status

Fractures of Index/Middle/Ring Metacarpal Neck/Head

Less common than little metacarpal head/neck fractures
Standard AP and OBLIQUE x-rays of the hand are adequate
If rotational deformity- REFER ON-CALL ORTHOPAEDICS
No rotational deformity present then:

- ✓ Buddy strap affected and adjacent finger
- ✓ High elevation sling
- ✓ Adequate analgesia
- ✓ Virtual fracture clinic

Proximal and Middle Phalangeal Fractures

Suspected proximal or middle phalangeal fracture

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Assess and document ROTATIONAL DEFORMITY

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Request FINGER x-ray

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Proximal or middle phalangeal fracture
+/- rotational deformity

YES

Buddy strap affected and adjacent fingers
Adequate analgesia
High elevation sling
Virtual Fracture Clinic

NO

Buddy strap affected and adjacent fingers
Adequate analgesia
High elevation sling
Early mobilisation
Discharge- No follow-up

Distal Phalangeal Fracture

These are often associated with a crush injury and nail-bed wound.
These do not require antibiotics even if open. Irrigate, close wound, buddy strap.

Dislocated finger

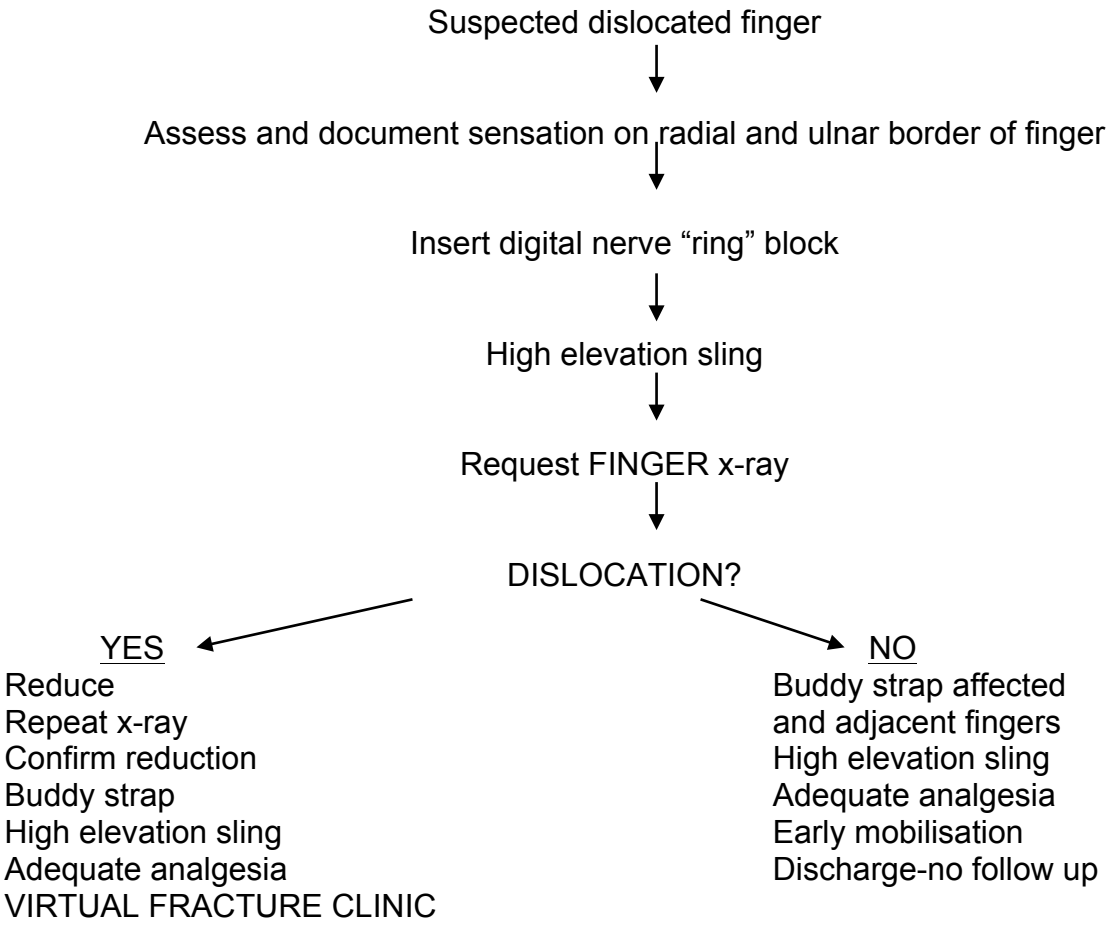
Fingers typically dislocate in a dorsal/palmar plane. Deformed fingers with radial/ulnar angulation are usually fractured with associated collateral ligament injury

Reducing a dislocated finger

Generally the dislocation will be dorsal

1. Ensure the finger is anaesthesised
2. Palpate the dislocated articular surface on the dorsal aspect of the finger
3. Whilst applying GENTLE traction to the finger- push the articular surface distally back into joint
4. It will be clinically apparent when the dislocation is reduced

Where the dislocation is associated with a fracture- reduction should still be attempted



Dislocated Meta-Carpal phalangeal joint

These injuries are generally difficult to reduce owing to the difficulty in achieving adequate local regional anaesthesia.

They are also associated with moderate to severe functional impairment.

- ✓ Diagnosed on AP and oblique and x-rays
- ✓ High elevation sling and adequate analgesia
- ✓ Refer to on-call orthopaedics.

Hand Injuries

Ulnar Collateral Ligament Rupture

This is sometimes called Gamekeeper's or Skier's thumb

The ulnar collateral ligament is part of the stabilisation mechanism of the thumb metacarpal phalangeal joint.

It is of vital functional importance in providing stability of the pincer grip between thumb and index fingers

Associated with hyper-abduction injury of the thumb metacarpal phalangeal joint

Ulnar collateral ligament rupture is a functional disaster

Adopt a low threshold of suspicion for this injury in any patient with a painful thumb and an associated relevant mechanism of injury

Examining UCL

1. Examine the unaffected side first
2. Stabilise the thumb metacarpal head on the radial border
3. Move the proximal phalanx into full ABDUCTION
4. Assess for demonstrable laxity

If the ligament is intact, resistance will be felt at full abduction

Examination Findings	Management Plan
DEMONSTRABLE LAXITY	X-ray Thumb Rhizo Forte Splint Adequate analgesia and high elevation sling REFER ORTHOPAEDICS
UNABLE TO ASSESS DUE TO PAIN AND/OR SWELLING	X-ray thumb Rhizo Forte Splint Adeqaute analgesia and high elevation sling ED Review in 5 days
NO LAXITY	X-Ray thumb Wrist splint with thumb extension Adequate analgesia Early mobilisation and DISCHARGE

Mallet Injury

Mallet injury involves injury to the distal phalanx associated with disruption of the distal extensor mechanism thereby preventing active extension of the DIPJ
See mallet finger guideline on CEM.

Pelvic Injuries

Pelvic injures are associated with significant trauma and high velocity injuries. In this context, they will often be diagnosed and evaluated on trauma CT scan series of CT Head/Neck/Chest/Abdomen/Pelvis

Initial management of pelvic injuries in ED includes ABDCE assessment, adequate analgesia and SAM splintage to minimise associated blood loss

Urethral catherisation should be avoided until CT has excluded urethral injury.

Symptoms include:

- Pelvic pain
- External evidence of bruising either anterior or posterior
- Clinical evidence of hypovolaemia

Significant mechanism of injury
Clinical suspicion of pelvic fracture

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Manage in Resus

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ABCDE Assessment including C-Spine

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IV Access
Bloods including FBC and Group and Save

↓

IV Analgesia

↓

Application of SAM Splint

↓

Discussion with radiology regarding imaging
Low threshold for full body CT in context of significant mechanism of injury

↓

Refer to Orthopaedics on Call

BEWARE

Pelvic fractures can be associated with significant blood loss
This may be occult and in otherwise well patients may be physiologically compensated
Careful monitoring of patients cardiovascular status is necessary
Ensure that blood has been requested and is available for transfusion

Pu
Fra
am

In general terms, these fractures are managed conservatively

Clinical Features

- Simple fall
- Impaired or significantly compromised mobility
- Anterior pelvic tenderness
- Reduced hip flexion and hip abduction
- No shortening or external rotation of affected limb

Clinical suspicion of ramus fracture

↓

Adequate analgesia

↓

Request AP Pelvis and Hip X-ray

↓

Pubic Ramus Fracture

↓

Mobility Assessment

MOBILE
Consider discharge
Ensure adequate analgesia
Think about discharge support services
Think about falls risk/investigation

NON-MOBILE
Adequate analgesia
Refer orthopaedics

DISCHARGE?
Remember to involve patient's relatives in the discharge plan
ALWAYS take relatives reservations about discharge into account

MEDICAL ADMISSION?

Patients with frequent falls or who are at significant falls risk should be discussed with the receiving medical team for consideration of admission

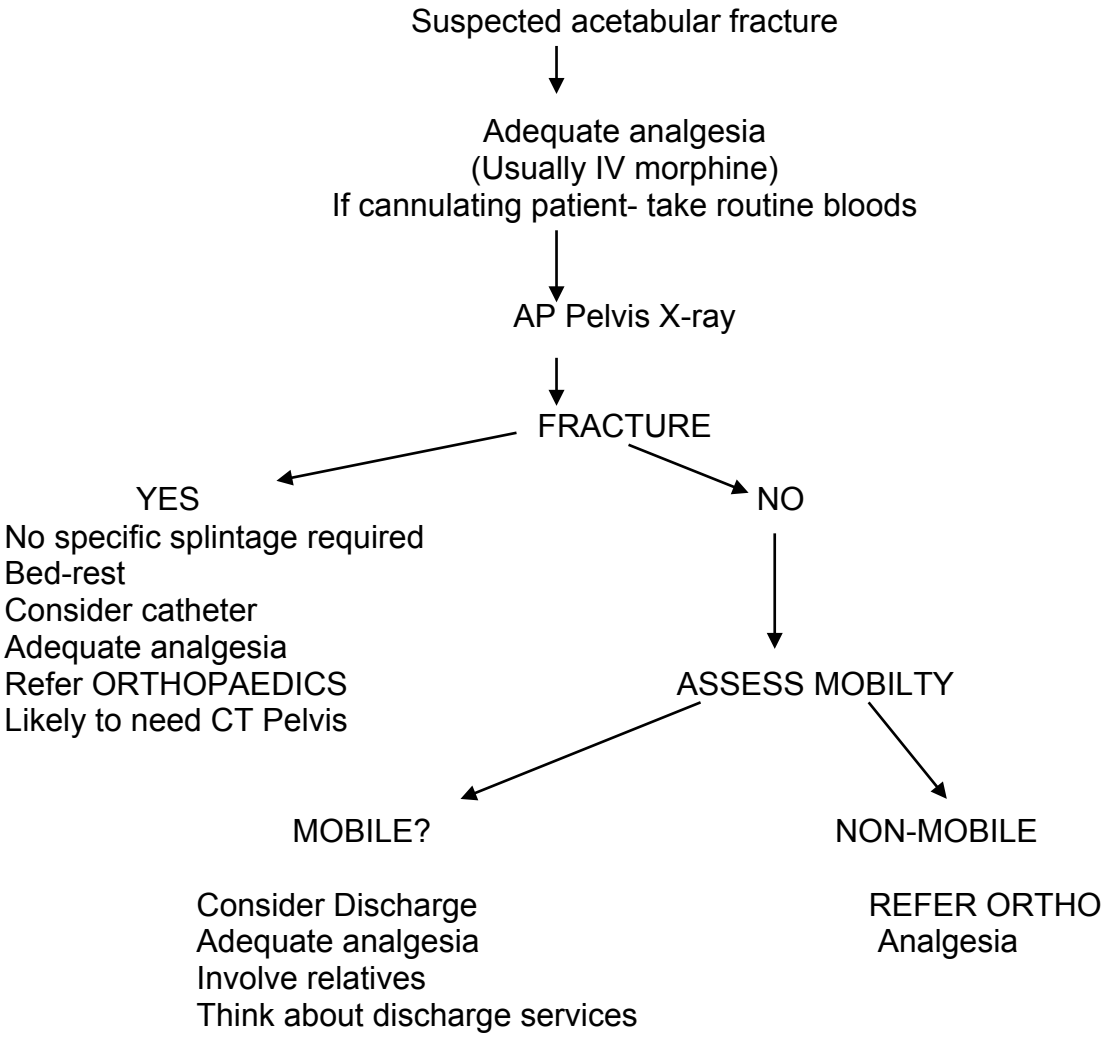
Similarly, where there is ambiguity regarding the circumstances of attendance (for example where the patient may have collapsed)- these cases should be discussed with the receiving medical team

Acetabular Fractures

The acetabulum is the “socket” component of the ball and socket hip joint
Common amongst elderly patients, even after comparatively insidious falls

Clinical features

- Severe unilateral pain
- Global reduction in range of hip movement
- No shortening or rotation
- Patient non-weight bearing



HIP INJURIES

Hip Dislocation

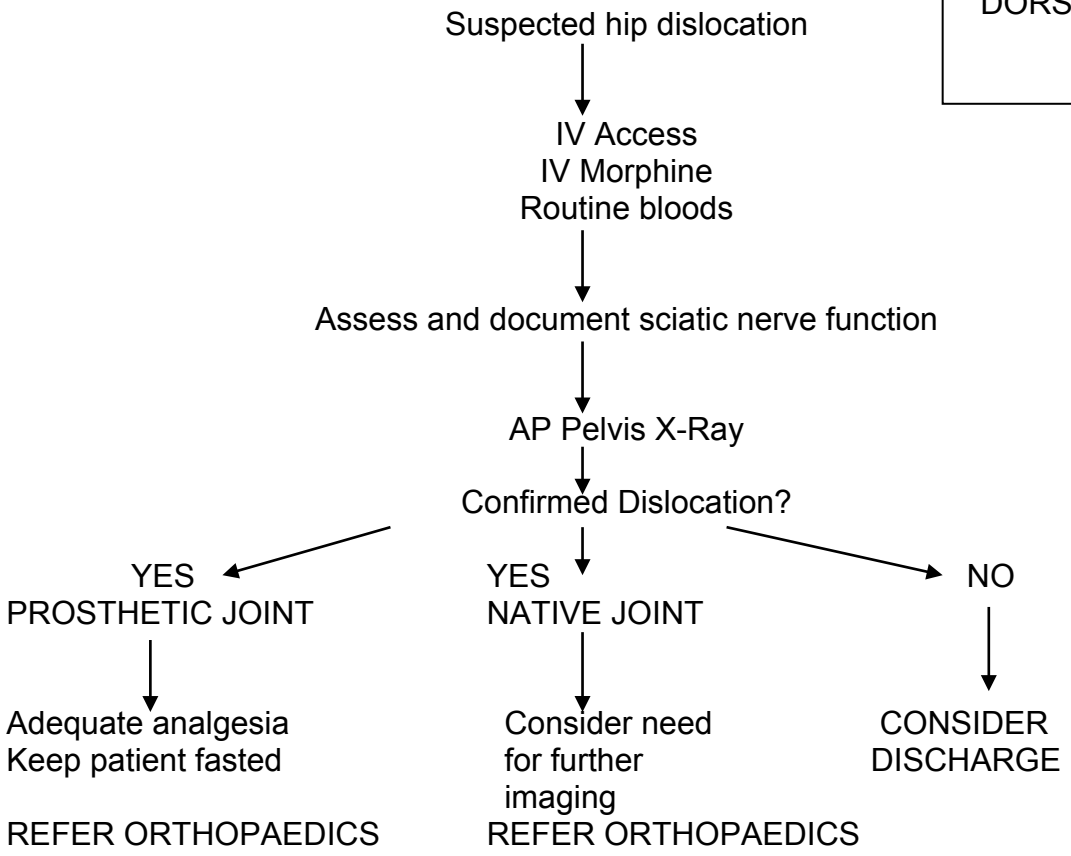
In general terms, dislocated hips are NOT reduced in ED
Patients with a dislocated hip usually require a GA to facilitate reductio

Type of Joint Dislocation	Clinical features
Native hip joint	Usually significant trauma ABCDE Approach Adequate analgesia Consider need for more extensive CT imaging
Prosthetic hip joint	Relatively minor mechanism Commonly recurrent presentation

Clinical Features

- Affected leg shortened
- Affected leg internally rotated
- Examine and document sciatic nerve function

SCIATIC NERVE ASSESSMENT
Motor Function
DORSIFLEX foot against resistance



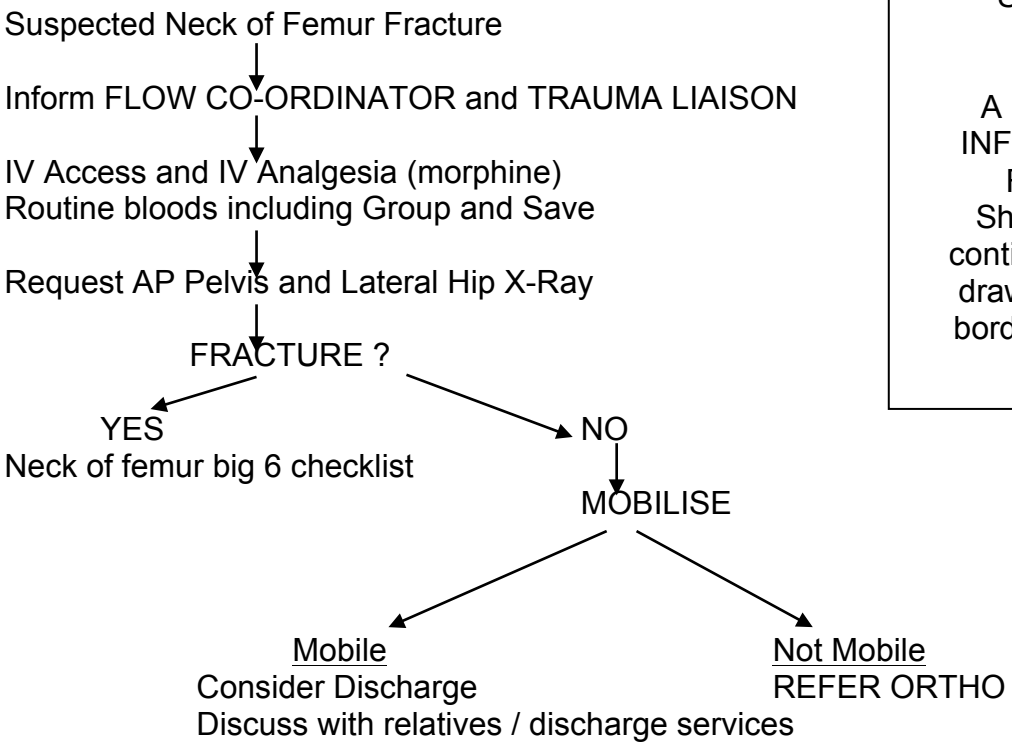
Neck of Femur Fracture

Clinical Features
Elderly patients following a simple fall
Affected leg shortened
Affected leg internally rotated

Classification
There are several classifications of neck of femur fracture which are generally more pertinent to the receiving orthopaedic service
From and ED perspective, classify neck of femur fractures as

Classification	Clinical Features	Management
INTRACAPSULAR	More proximal injury Femoral head becomes avascular	Hemi-arthroplasty Worse prognosis Generally longer in-patient hospital stay
EXTRACAPSULAR	More distal injury Nutrient supply of femoral head is maintained Generally seen on AP Pelvis	Dynamic Hip Screw (DHS) Less invasive operative procedure and earlier mobilisation combine to given a better prognosis

Investigation
Request AP Pelvis and Lateral View of affected hip
Intracapsular fractures are sometimes best seen on the lateral hip x-ray
Radiographers will provide a chest x-ray on patients over 65 who have a radiologically diagnosed neck of femur fracture



SHENTONS LINE-
AP PELVIS XR

A line drawn from the INFERIOR border of the FEMORAL NECK Should form a smooth continual curve with a line drawn on the INFERIOR border of the SUPERIOR RAMUS

Patients with a fractured neck of femur fracture should be admitted directly to the receiving orthopaedic ward. Admission MUST NOT be delayed to allow review by the receiving orthopaedic doctor in ED. Patients can be reviewed by the receiving orthopaedic doctor and "clerked-in" once they are comfortable and in a bed in the orthopaedic ward

Parameter to consider	Completed
Fracture confirmed on AP and Lateral Hip X-Ray	
Long femoral X-Ray if history of malignancy	
Chest x-ray	
Bloods including Group and Save	
Kardex with as required analgesia (ORAMORPH 5mg)	
Consider urinary catheter (especially in females)	
Consider fascia iliaca block if ongoing analgesia needed	
IV fluids and fasting instructions	
Inform patient and relatives of diagnosis and plan	
Inform trauma liaison and/or orthopaedic ward	
Inform receiving orthopaedic doctor	

Fascia iliaca blocks are a useful adjuvant to opiate analgesia, especially in elderly frail patients

Fascia Iliaca Block- Landmarks

Draw a line from the Anterior Superior Iliac Spine
To the Pubic Tubercle

↓

Divide the line into THIRDS

↓

Identify the junction between the LATERAL THIRD
and the MEDIAL TWO-THIRDS

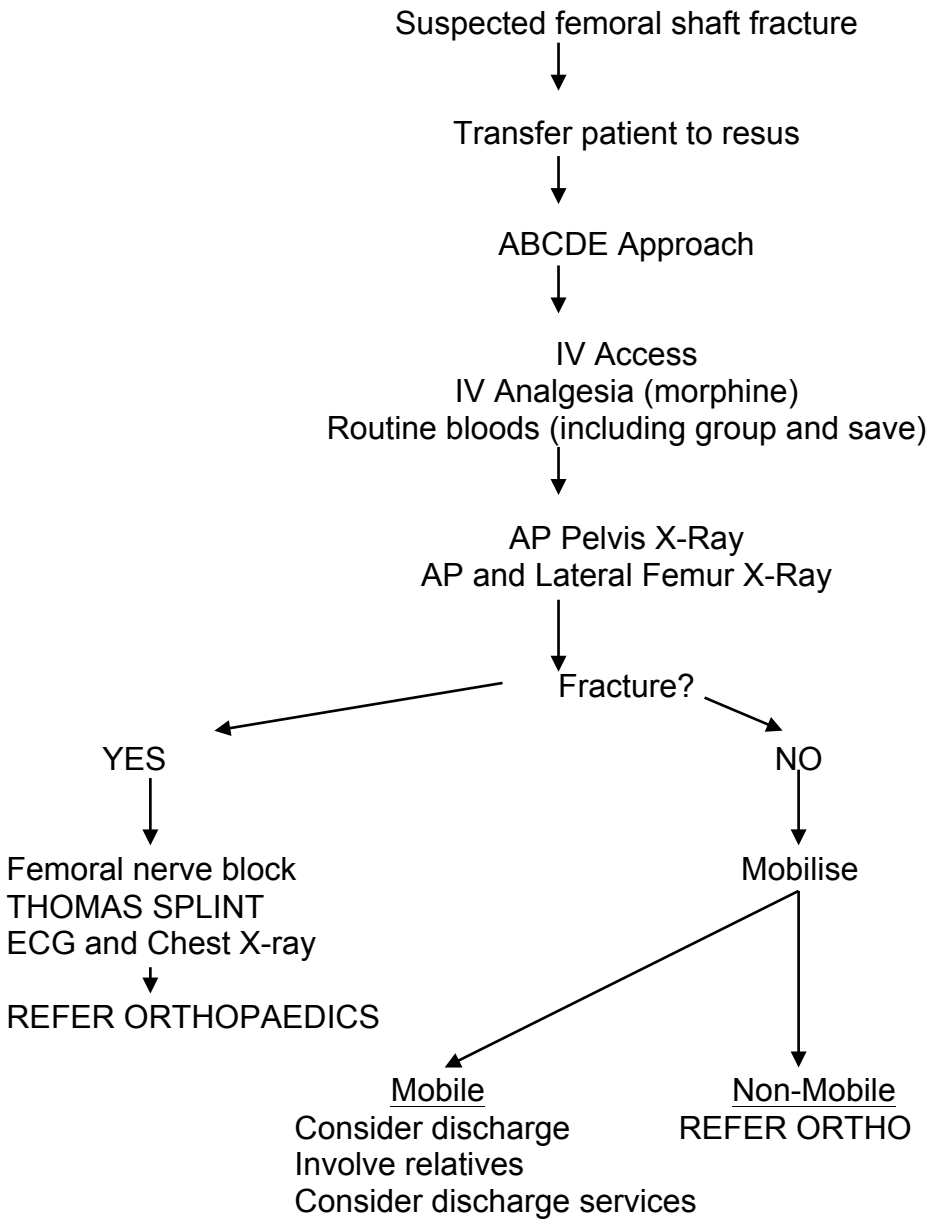
↓

Injection point is 1cm DISTAL to this junction

There is a box of equipment specifically organised to administer a block.
Two separate "pops" are felt as the needle is advanced into the compartment
The local anaesthetic should infiltrate easily into the compartment

Femoral Shaft Fracture

A fracture of the femoral shaft is associated with significant blood loss.



FEMORAL NERVE BLOCK

Use bupivicaine
Landmark is 1cm to FEMORAL PULSE
Needle inserted to 2-3 cm- perpendicular to skin
Aspirate to exclude blood vessel cannulation
Infiltrate in a “fanning motion”
Apply pressure

Knee Injuries

The majority of knee injuries are soft tissue in nature. It is often possible to identify the diagnosis related to the mechanism of injury.

STRUCTURE INJURED	TYPICAL MECHANISM OF INJURY	COMMON EXAMINATION FINDINGS
ANTERIOR CRUCIATE LIGAMENT	Hyper-extension injury	Significant effusion Pain/laxity on ANTERIOR DRAWER test
POSTERIOR CURCIATE LIGAMENT	Fall onto FLEXED knee with anterior trauma to proximal tibia	Significant effusion Pain/laxity on POSTEIROR DRAWER test
MEDIAL COLLATERAL LIGAMENT	Lateral trauma resulting in VALGUS strain	Medial tenderness/laxity on VALGUS stress
LATERAL COLLATERAL LIGAMENT	Medial trauma resulting in VARUS strain	Lateral tenderness/laxity on VARUS stress
MEDIAL/LATERAL MENSICUS	Twisting injury with foot planted on the ground	Joint line tenderness McMurray's test - crepitus

Examination Techniques

Anterior Drawer Test

- Patient on a trolley
- Hip flexed and knee flexed
- Stabilise foot (easiest by sitting on it!)
- Index to little fingers of each hand in popliteal fossa, thumbs on tibial tuberosity
- Pull on proximal tibia
- Test is POSITIVE if laxity is felt and proximal tibia moves beyond distal femur

Posterior Drawer Test

- Patient on a trolley
- Hip flexed and knee flexed
- Stabilise foot (easiest by sitting on it!)
- Index to little fingers of each hand in popliteal fossa, thumbs on tibial tuberosity
- Push on proximal tibia
- Test is POSITIVE if laxity is felt and the proximal tibia moves under the distal femur

Valgus Stress Test

- Patient on a trolley
- Hip flexed and knee extended
- One hand over lateral femoral condyle, one hand over medial maeollus
- Apply VALGUS stress (move lower leg away from mid-line)
- Assess for tenderness over medial collateral ligament and laxity when compared with the unaffected side

Varus Stress Test

- Patient on a trolley
- Hip flexed and knee extended
- One hand over medial femoral condyle
- One hand over lateral maeollus
- Apply VARUS stress (move lower leg towards mid-line)
- Assess for tenderness over lateral collateral ligament and laxity when compared with the unaffected side

McMurray's Test (Medial Meniscus)

- Patient on a trolley
- Hip flexed and knee flexed
- Find joint line- palpate tibial tuberosity- 1cm superior to this
- Thumb in medial aspect of joint line
- Place other hand under the patient's heel
- Rotate the foot outwards- away from the mid-line
- Gently passively extend the knee
- Assess for pain and crepitus at the meniscus (under your thumb)

McMurrays test is not as sensitive for lateral meniscus pathology- the examiner's thumb should be placed over the lateral meniscus and the foot turned inwards (towards mid-line) then passively extend knee.

Knee X-rays

Most knee injuries- even with significant swelling and limitation of function, are soft tissue in nature

Apply the Ottawa Knee Rules to determine which patients require knee x-rays

Indications for knee x-ray- At least ONE of the following:

- Patient over age of 55 years
- Tender fibula head
- Tender patella
- Flexion reduced to less than 90°
- Inability to weight bear 4 steps

REMEMBER

When x-raying knees, a lipo-haemarthrosis is a concerning feature.

The emulsification process takes 10-15 minutes for this to occur

Patients MUST be conveyed to x-ray on a trolley to allow this process to take place prior their x-ray being taken

Interpretation of knee x-rays

Lateral X-ray

Look for lipohaemarthrosis- evidence of fluid level in the supra-patella pouch- suggestive of intra-articular fracture

AP X-ray

Draw a straight line directly inferior from the medial and lateral condyles of the distal femur. None of the tibia should be visible beyond this line.
Egress of the tibia beyond this line suggests a tibial plateau fracture.

Management of Soft-Tissue Knee Injuries

Injury Classification	Clinical Features	Initial Management	Follow-up
MINOR INJURY	Weight bearing No effusion No instability Full active extension Established OA	Rest Ice Compression Elevation Tubigrip if required Knee exercise sheet Adequate analgesia Emphasis on early mobilisation	GP Consider physiotherapy depending on patient's base-line function and likely compliance
MODERATE INJURY	Non-weight bearing Minor effusion Diagnostic uncertainty No demonstrable instability	Rest Ice Compression Elevation Tubigrip if required Knee exercise sheet Adequate analgesia Emphasis on early mobilisation	Review at SOFT TISSUE CLINIC in 10-14 days post injury
SEVERE INJURY	Acute haemarthrosis Demonstrable ligamentous laxity Locked Knee	Adequate analgesia Elevate knee REFER ORTHOAPEDICS	ORTHOPAEDIC REFERRAL

BEWARE

If it is not possible to conduct a full examination due to pain then SOFT TISSUE CLINIC FOLLOW-UP in at least 5-7 days should be arranged

Summary of Approach to Knee Injures

History Elicitation
Ensure robust understanding of exact mechanism of injury

↓

Adequate analgesia

↓

Focussed examination
Assess for instability and/or laxity

↓

Consider x-ray
See above for indications

Categorise injury

MILD	MODERATE	SEVERE
RICE Tubigrip Analgesia	RICE Tubigrip Analgesia	Elevate Analgesia
GP Physiotherapy	Soft Tissue Clinic Physiotherapy	REFER ORTHO

Locked Knee

A locked knee is one which is held in FLEXION.
This is typically associated with a meniscal injury and will generally required urgent MRI +/- Arthroscopic decompression.

NEVER attempt to “force” the knee into an extended position- this is unlikely to be successful and will undoubtedly be extremely painful.

Suspected “locked” knee

↓

Patient unable to actively extend knee
Not weight bearing

↓

Adequate analgesia

↓

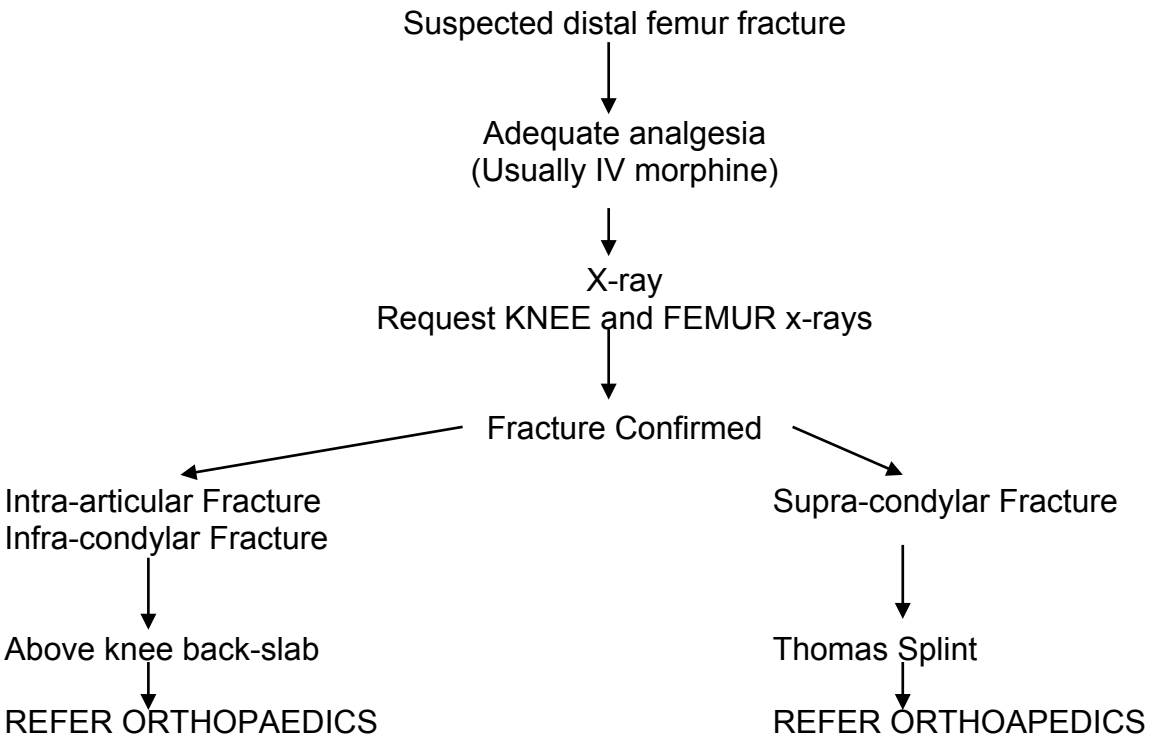
Knee x-ray

↓

Refer to orthopaedics on-call

Distal Femur Fracture

Common periprosthetic fracture in patients with total knee replacement



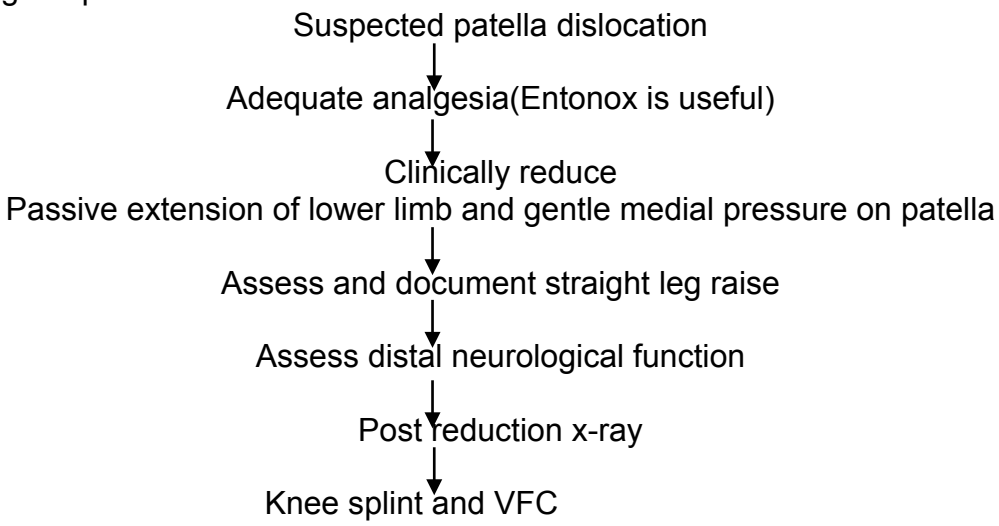
In patients with confirmed distal femur fracture- consider pathological fracture.

Distal Femur Fracture Check-list

- ✓ Adequate analgesia- including Kardex with as-required analgesia
- ✓ Immobilisation as above depending on fracture site
- ✓ Routine bloods including LFT and bone profile
- ✓ Chest x-ray
- ✓ Refer to on-call orthopaedics

Patella Dislocation

Patella dislocation usually occurs laterally. It is generally easy to reduce- usually be extending the patient's knee.



Knee Effusion

Many patients present with non-traumatic knee effusion.
In anti-coagulated patients with a traumatic effusion- aspiration and compression dressing can alleviate symptoms

Non-traumatic effusion
↓
ABCDE Assessment
Routine observations
↓
IV Access
Bloods- Including CRP/ESR and Urate
Blood cultures
↓
Adequate Analgesia
↓
Knee x-ray
REFER ORTHPAEDICS

Tibial Plateau Fracture

Common in elderly patients after relatively minor trauma
In younger patients- represents significant mechanism of injury

Clinical features

- Significant effusion
- Reduced active range of movement
- Unable to weight bear

X-ray findings

- Tibia migrates beyond lines drawn perpendicularly inferior from condyles on AP x-ray
- Lipohaemarthrosis on lateral x-ray

Management

- Adequate analgesia
- Above knee back-slab
- Elevate leg
- Refer to on-call orthopaedics

TIBIAL PLATEAU FRACUTRE
Patients generally will have CT knee to more comprehensively assess the fracture

Generally patients require bone grafting +/- reconstructive intervention

Proximal Fibula Fracture

Common “fender fracture” where pedestrians are knocked-down and struck by the bumper of a car

Suspected proximal fibula fracture
↓
Adequate analgesia
↓
Assess and document
COMMON PERONEAL NERVE FUNCITON
↓
Request Tibia and Fibula X-ray
↓
Fracture Confirmed
↓
Padded crepe bandage
Non-weight bearing with crutches
Adequate analgesia
↓
REFER VIRTUAL FRACTURE CLINIC

ASSESSMENT OF COMMON PERONEAL NERVE FUNCTION

Sensory function
Lateral border of foot

Motor function
Dorsiflexion of foot
Eversion of ankle

Ankle Injuries

Ankle injuries represent the most common musculoskeletal presentation in ED.

History

Establish the mechanism of injury.
Most common is an inversion injury or a forced plantar flexion injury
Document whether the patient is able to weight-bare

Examination

LOOK
Assess for bruising/swelling
Document any deformity

Feel

Palpate:

1. Medial maeollus
2. Lateral maeollus (posterior aspect)
3. Base of 5th Metatarsal
4. Calcaneus
5. Proximal fibula
6. Specific ligaments

LIGAMENT	ANATOMICAL LOCATION
Anterior Talofibular Ligament	Lateral maeollus extending anteriorly onto talus- most commonly injured
Calcaneo-Fibular Ligament	Lateral maeollus extending inferiorly towards calcaneum
Deltoid Ligament	3 part ligament extending from medial maeollus. Much stronger and less frequently injured than lateral ligaments

Move

Ankle movements are of DORSIFLEXION (foot “lifting-up”) and PLANTARFLEXION (foot “pointing-down”)

TALAR TILT TEST
Position the patient in a neutral position Examine the unaffected side first for comparison purposes Apply passive INVERISON to the ankle Assess for laxity at full inversion

If possible- each movement should be assessed against resistance however this is likely to be very difficult in a recently injured ankle.

MOVEMENT	MUSCLE BEING ASSESSED	ANATOMICAL LOCATION
DORSIFLEXION	Tibialis Anterior	Anterior shin
PLANTAR FLEXION	Gastrocnemius	Calf
INVERSION	Tibialis Posterior	Anterior shin
EVERSION	Peroneus Brevis Peroneus Longus	Lateral aspect of lower leg

Active and Passive examination of the ankle should focus on determining the presence of demonstrable ligamentous laxity

Who to X-ray:
Apply the OTTOWA ANKLE RULES to stratify which patients require an x-ray:

Request ANKLE X-RAY where ANY of the following are present:
1. Bony tenderness over distal 6cm of POSTERIOR DISTAL TIBIA
2. Bony tenderness over tip of MEDIAL MAEOLLUS
3. Bony tenderness over distal 6cm of POSTERIOR DISTAL FIBULA
4. Bony tenderness over tip of LATERAL MAEOLLUS
5. Inability to weight bare 4 steps in ED

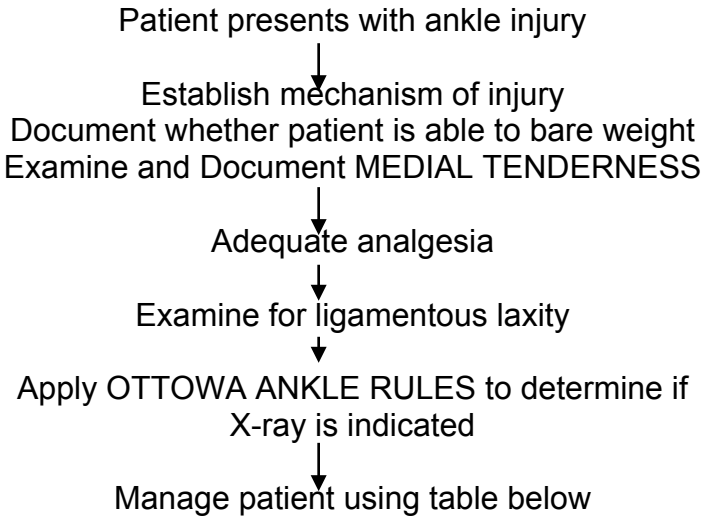
Request FOOT X-RAY where ANY of the following are present:
1. Bony tenderness over NAVICUALR (dorsum of foot)
2. Bony tenderness over BASE OF 5th METATARSAL (lateral foot)
3. Inability to weight bare 4 steps in ED

It is very uncommon for patients to require ankle and foot x-rays and it is usually possible to differentiate between these investigations by adequate clinical examination

Interpreting the x-ray:

View	Features
AP	Look for lateral maeollus fracture Assess syndemosis Look for medial maeollus fracture Assess for TALAR SHIFT
LATERAL	Look for posterior maeollus fracture Look for anterior avulsion fracture from distal tibia

Approach to Ankle Injuries



Examination/ X-ray Findings	Management
No ligamentous laxity X-ray NOT indicated	RICE Adequate analgesia Ankle exercise leaflet
Ligamentous laxity X-ray NOT indicated OR X-ray shows no fracture	Consider walking boot Adequate analgesia Ankle exercise leaflet Soft-tissue clinic follow-up- 10 days
No ligamentous laxity- X-ray shows no fracture	RICE Adequate analgesia Ankle exercise leaflet Crutches if not weight baring
X-ray shows ankle fracture	Assess for talar shift Establish Weber classification

Discharge Advice for patients with ankle sprain

Patients frequently complain of having a “weak ankle” and frequently present with recurrence of inversion injuries and mild/moderate ankle sprains. This is generally caused by inadequate rehabilitation of a previous injury

1. Patients should be advised to regularly exercise their ankle to maintain movement and stability and encourage rehabilitation. They should be given an ankle exercise leaflet and encouraged to undertake the manoeuvres described on a regular basis

2. Tubigrip can be used if the patient has moderate to severe soft tissue swelling and/or pain.

3. Breg boots are useful for patients with severe swelling or demonstrable laxity. The patient should be reminded that the boot may require to be adjusted as their swelling resolves to ensure it remains adequately supportive

4. Any immobilisation should be used for two weeks. One week at ALL TIMES and the second week only when outdoors as the undulating ground outside requires increased proprioceptive input and puts additional strain on ligaments to maintain balance

5. Patients who are unable to weight bare but have no positive examination findings and a normal x-ray can be discharged with crutches. It is NOT NECESSARY to arrange follow-up for these patients and they should be invited to return the crutches to ED once they are no longer required

6. Patients with demonstrable ligamentous laxity should be referred to the soft tissue clinic AT LEAST one week post injury and preferably 10-14 days after injury to allow swelling to resolve.

Ankle rehabilitation takes 2-3 weeks depending on the severity of the injury

DURATION SINCE INJURY	PROGNOSTIC FEATURES
ONE WEEK	RICE 3-4 Times daily ankle exercise If used: Tubigrip/Breg Boot at ALL TIMES
TWO WEEKS	3-4 Times daily ankle exercise If used: Tubigrip / Breg Boot when OUTDOORS Soft Tissue Appointment if arranged
THREE WEEKS	Weaning of immobilisation Gradual return to athletic activity governed by pain

Approach to Ankle Fractures

Patient presents with ankle injury

↓

Establish mechanism of injury
Document whether patient is able to bare weight
Examine and document MEDIAL TEDNERNESS

↓

Adequate analgesia

↓

Examine for ligamentous laxity

↓

Apply OTTOWA ANKLE RULES to determine if X-ray is indicated

↓

X-ray shows fracture

↓

Assess X-ray for Talar Shift
Classify distal fibula fractures using Weber Classification

Weber Classification	Site of Distal Fibula Fracture
A	Distal to Syndesmosis
B	At level of Syndesmosis
C	Proximal to Syndesmosis

The syndesmosis is the fibrous joint between the distal tibia and the fibula. This joint has an essential role in maintaining stability of the ankle

BEWARE

It is essential to document:
MEDIAL TENDERNESS
MEDIAL SWELLING
MEDIAL BRUSING
This is important for the virtual fracture clinic in stratifying follow-up

Management of Ankle Fractures

DIAGNOSIS	ED TREATMENT	FOLLOW-UP
TIP OR LATERAL MAEOLLUS FRACTURE	• RICE • Adequate analgesia • Ankle advice leaflet • Breg Boot OR Tubigrip depending on pain • Weight Baring	Discharge to GP
AVULSION FRACTURE MEDIAL MAEOLLUS	• RICE • Adequate analgesia • Ankle advice leaflet • Breg Boot OR Tubigrip depending on pain • Weight Baring **EXAMINE AND DOCUMENT PROXIMAL FIBULA**	Discharge to GP
WEBER A FRACTURE	• RICE • Adequate analgesia • Ankle advice leaflet • Breg Boot • Weight Baring **REMEMBER MEDIAL EXAMINATION DOCUMENTAITON**	Discharge to GP Contact Fracture Clinic for symptoms persist after THREE MONTHS

WEBER B FRACUTRE- NO TALAR SHIFT	• RICE • Adequate analgesia • Ankle advice leaflet • Breg Boot • Weight Baring as able **REMEMBER MEDIAL EXAMINATION DOCUMENTAITON**	Refer to VIRTUAL FRACTURE CLINIC
WEBER B FRACUTRE- TALAR SHIFT	• Adequate Analgesia • Below Knee Back-slab	Refer to ON CALL ORTHOAPEDICS
WEBER C FRACUTRE- NO TALAR SHIFT	• RICE • Ankle advice leaflet • Breg Boot • Weight Baring as able **REMEMBER MEDIAL EXAMINATION DOCUMENTAITON**	Refer to VIRTUAL FRACTURE CLINIC
WEBER C FRACTURE – TALAR SHIFT	Adequate Analgesia Transfer to Resus Reduce under sedation Below knee Back-slab	Refer to ON CALL ORTHOPAEDICS

BEWARE- MAISONNEUVE FRACTURE

Medial Maeollus fracture associated with spiral fracture of proximal fibula

ALL PATIENTS with medial maeollus fracture MUST have documented examination of proximal fibula

If tender then a KNEE X-Ray IS REQUIRED

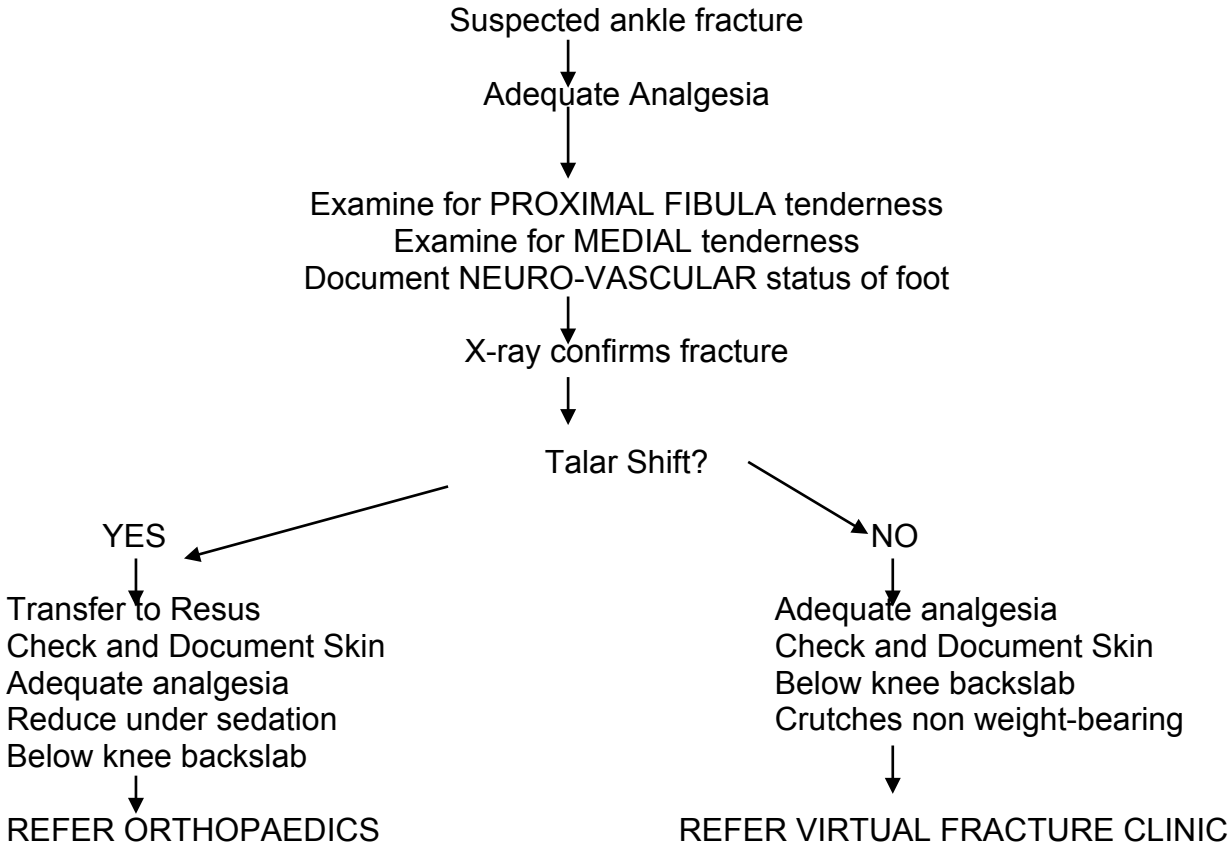
Application of a back-slab or walking boot to immobilise a medial maeollus fracture in patients with a Maisonneuve Injury increases the risk of peroneal nerve injury and subsequent foot -drop

ASSESSING TALAR SHIFT

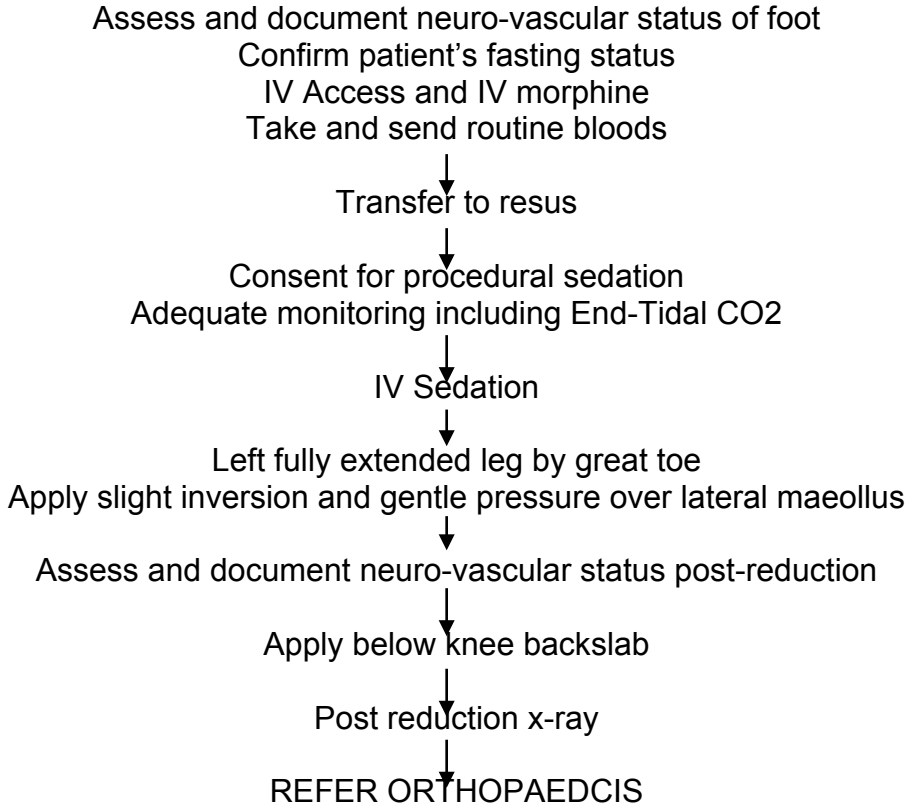
Use the AP view
The gap around the ANKLE MORTICE should be equal on the medial and lateral side

The superior talus should sit in a horizontal plane without any tilt

Management of Bimaeollar/Trimaeollar Fracture



<u>Reducing a Dislocated Ankle</u>



Foot Injuries

Calcaneal Fracture

Injuries to the calcaneum infrequently occur without significant trauma
This is a common injury after jumping from a height and landing on one or both feet.

Suspected calcaneal fracture

↓

Adequate analgesia

↓

Examine BOTH sides
Examine for lumbar spine tenderness
Document NEURO-VASCULAR status of foot

↓

Request CALCANEAL X-RAY

↓

Fracture Confirmed

↓

Check Skin
Adequate analgesia
ELEVATE and ICE

↓

REFER ORTHOPAEDICS

Patients with calcaneal fracture frequently need CT to establish degree of communition

BOHLER'S ANGLE

Calcaneal x-rays include a dedicated calcaneal view and a lateral ankle x-ray.
Fractures are easiest to diagnose on the lateral ankle x-ray

Draw a line from upper edge of posterior aspect of Calcaneus to superior point of calcaneus at sub-talar joint

Draw a second line from superior point of calcaneus at sub-talar joint to anterior process of calcaneus

The angle between these lines should be 20° to 40°. An angle of LESS THAN 20° indicates a fracture

Talus Fracture

Talus fractures are frequently associated with significant trauma and disruption of soft tissues of the foot
Patients with a talus fracture have gross soft tissue swelling and a marked reduction in active range of ankle movements
It is unusual to be able to weight-bare

Suspected Talus Fracture
↓
Adeqaute analgesia
↓
Assess NEURO-VASCULAR status of foot
Document swelling/bruising to foot
↓
Request ANKLE X-RAY
↓
Fracture confirmed
↓
Adequate analgesia
Check and document skin
Below knee back-slab
Non weight-bearing
Elevate
↓
REFER ORTHOPAEDICS

X-Ray Interpretation

Talus fractures most often occur at the neck
These are most readily seen on the lateral ankle x-ray

Patients with talus fractures often require CT ankle to establish degree of communition

Tarsal Fracture

Common mechanism of injury resulting in tarsal fracture
Forced plantar flexion injury
Crush injury- something dropped on foot or vehicle driven over foot

HIGH VELOCITY INJURY

This is likely to involve significant soft tissue trauma

- X-RAY
- ELEVATE and ICE
- Adequate analgesia
- REFER ORTHOAPEDICS
- Likely to need CT

MULTIPLE FRACUTRES

Refer patients with multiple tarsal fractures to orthopaedics irrespective of displacement

Suspected tarsal fracture

↓

Establish mechanism of injury
Document if HIGH VELOCITY injury

↓

Adequate analgesia

↓

Document NEURO-VASCULAR status of foot
Document swelling/bruising
Document whether patient can weight-bare

↓

Request FOOT X-RAY

↓

Fracture confirmed
DISPLACEMENT PRESENT

↙ YES

Adequate Analgesia
Check and document skin
Elevate
Below-knee Backslab

↓

REFER ORTHOPAEDICS

↘ NO

Adequate analgesia
Check and document skin
Breg Boot
Crutches-weight bare as able

↓

REFER VIRTUAL FRACUTRE CLINIC

Assessing Displacement

AP VIEW

Base of 2nd Metatarsal MUST align with INTERMEIDATE CUNEIFORM

OBLIQUE VIEW

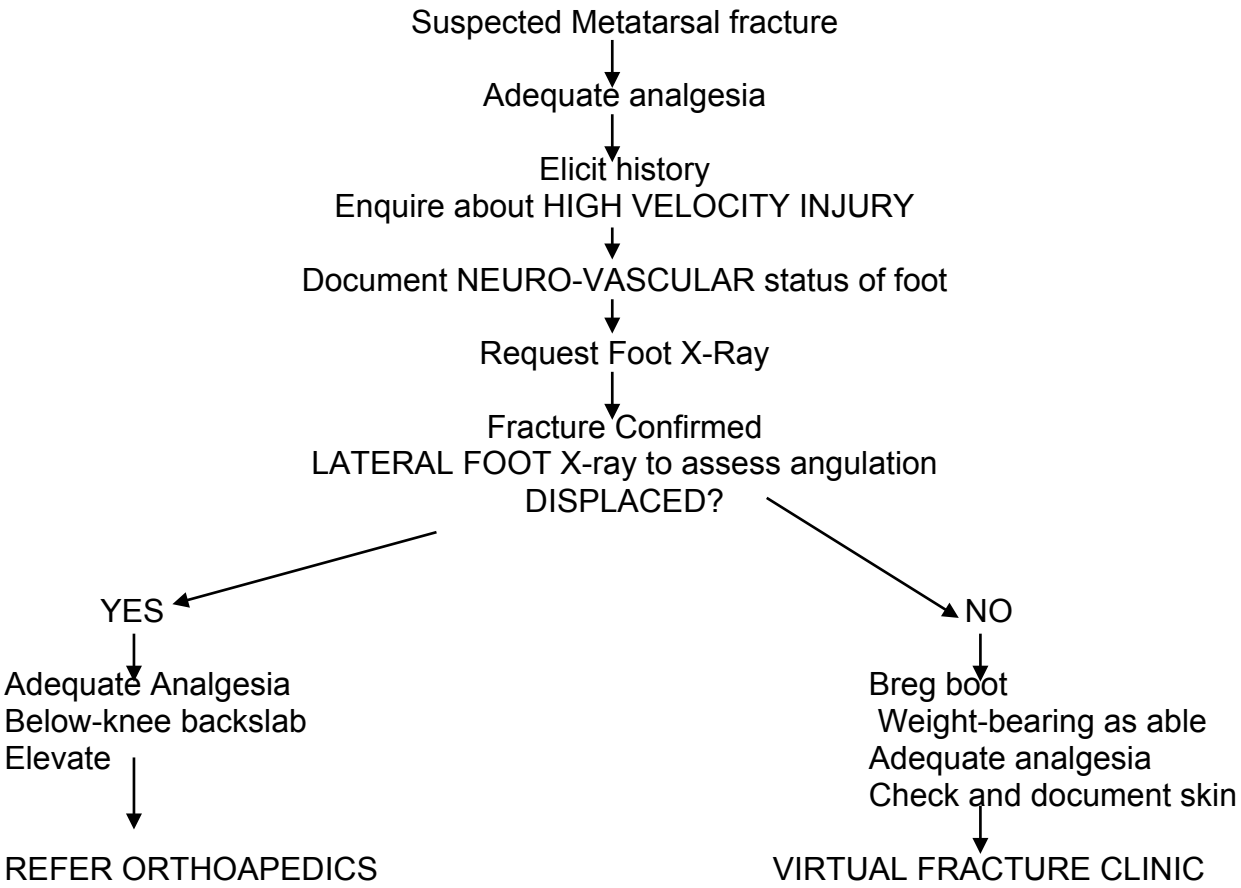
Base of 3rd Metatarsal MUST align with LATERAL CUNEIFORM

HIGH VELOCITY INJURY

Significant trauma to the foot raises the possibility of occult injury.
Refer patients to orthopaedics for consideration of CT
Adequate analgesia
Elevate and ice

Metatarsal Fracture

Typically associated with a crush injury to the foot or forced plantar flexion injury



Assessing Displacement

AP VIEW

Base of 2nd Metatarsal MUST align with INTERMEIDATE CUNEIFORM

OBLIQUE VIEW

Base of 3rd Metatarsal MUST align with LATERAL CUNEIFORM

Lisfranc Fracture

Fracture of base of 2nd and/or 3rd metatarsals with disruption of tarsal/metatarsal joints
Typically associated with a crush injury to the foot or forced plantar flexion injury against resistance such as falling off a ladder and striking dorsum of foot against a rung

Clinical Features

- Suspicious mechanism of injury
- Gross swelling and/or bruising to dorsum of foot
- Significant pain

Suspected Lisfranc fracture

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Adequate analgesia

↓

Elicit history
Enquire about HIGH VELOCITY INJURY

↓

Document NEURO-VASCULAR status of foot

↓

Request Foot X-Ray

↓

LISFRANC INJURY CONFIMRED

↓

Adequate Analgesia
Check and document skin
Below-knee backslab
Elevate

↓

REFER ORTHOPAEDICS

Assessing Displacement

AP VIEW

Base of 2nd Metatarsal MUST align with INTERMEIDATE CUNEIFORM

OBLIQUE VIEW

Base of 3rd Metatarsal MUST align with LATERAL CUNEIFORM

Base of 5th Metatarsal Fracture

Typically associated with an ankle inversion injury caused by an avulsion injury of the peroneus Brevis tendon

Differentiate between whether ankle or foot x-rays are required. It is very unusual for both to be needed

Discharge simple fractures with Breg boot and advice sheet

JONES FRACTURE

Fracture of proximal 5th metatarsal at joint between 4th and 5th metatarsal bases

Prone to non-union

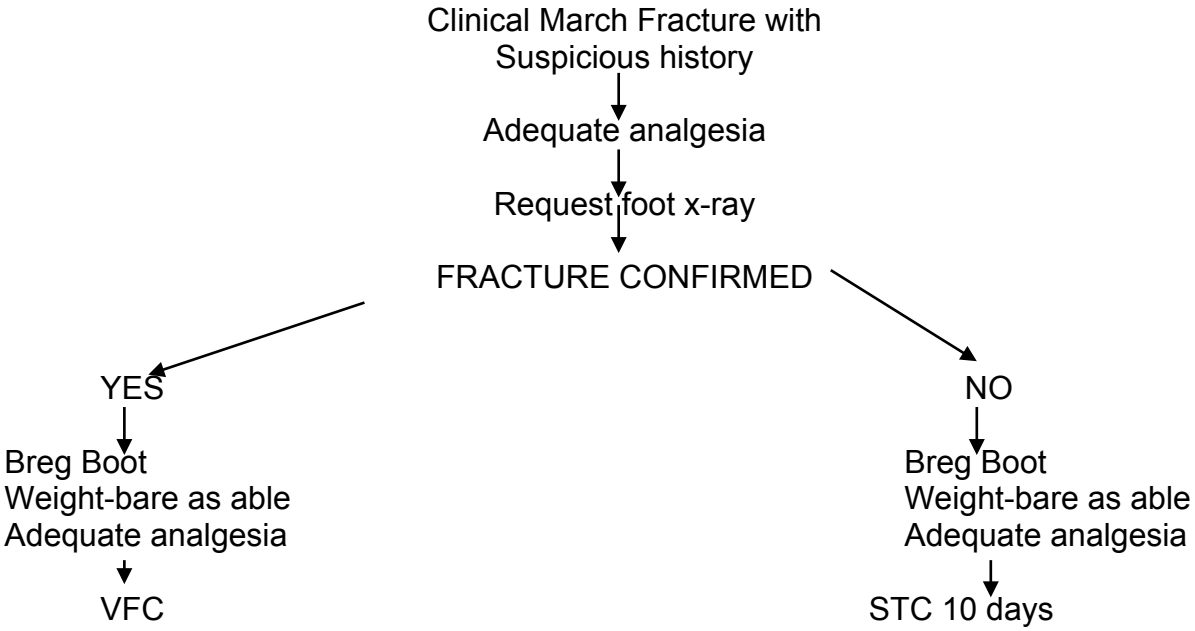
Treat in Breg boot but VFC follow up

March Fracture

Stress fracture of third metatarsal neck

Clinical features

- Insidious tenderness to dorsum of foot
- Painful to weight-bare
- Associated with commencement of new activity



BEWARE

March fracture is prone to non-union resulting in chronic foot pain

If the history and examination is consistent but there is NO fracture- then FOLLOW-UP MUST be arranged for repeat examination and consideration of second x-ray

Toe Injuries

Toe injuries generally require only symptomatic treatment

Indications for Toe X-ray

- Clinical dislocation
- Metatarsal head tenderness
- Great toe injury

Toe Injury
↓
Adequate analgesia
↓
Document NEURO-VASCULAR status of toe
Assess for metatarsal head tenderness
Assess for dislocation
↓
Is x-ray indicated

DIAGNOSIS	MANAGEMENT
Clinical toe fracture OR Fracture confirmed on x-ray	Buddy-strap adjacent toes Adequate analgesia Discharge- GP follow-up
Dislocated toe	Digital local anaesthetic block Reduce Post-reduction x-ray Buddy strap adjacent toes Discharge – GP follow-up REFER ORTHOPAEDICS if unable to reduce
Intra-articular great toe fracture	Toe Spica bandage Adequate analgesia Weight-bare Document neuro-vascular status of toe REFER VIRTUAL FRACTURE CLINIC