Limb Trauma

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- Types of Fracture
  - Description
    - Site: bone fractures, part of bone (proximal, shaft, distal)
    - Line: transverse, oblique, spiral, multi fragmentary
    - Displacement: angulation, translation, rotation
  - Avulsion fracture
    - Tendon shears of a fragment of bone
    - Typically in athletes
- # Management
  - Principles
    - Reduction
    - Immobilisation
    - Rehab
  - General
    - Usually need to correct rotational or valgus or varus deformity
    - Reduction can be performed as either an open or closed procedure
    - Immobilisation is required until fracture union
  - Fixation
    - Internal
      - Indications
        - Intraarticular fractures - to stabilise anatomical reduction
        - Repair of blood vessels and nerves - to protect vascular and nerve repair
        - Multiple injuries
        - Elderly patients - to allow early mobilisation
        - Long bone fractures
        - Failure of conservative management
        - Pathological fractures
        - Fractures that require open reduction
        - Unstable fractures
      - Complications
        - Infection
        - Non-union
        - Implant failure
        - Refracture
    - External
      - Indications
        - Acute trauma - open and unstable fractures
        - Non union of fractures
        - Correction of joint contracture
        - Filling of segmental limb defects - trauma, tumour and osteomyelitis
        - Limb lengthening
      - Complications
        - Overdistraction
        - Pin-tract infection
- # Complications
  - Immediate: bleeding, organ injury, nerve or skin injury, vessel injury
  - Later Local: skin necrosis, pressure sores, infection, delayed union
  - Later General: venous / fat embolism, PE, pneumonia, renal stones
  - Compartment Syndrome
    - Bleeding into fascial compartment
    - Limb and life threatening
      - Fluid loss, DIC and myoglobin release cause renal tubular necrosis - dialysis may be needed
      - Causes vascular occulsion impairing blood supply, with potential for nerve damage and muscle death
    - Prompt fasciotomy is limb and life saving
  - Rhabdomylosis
    - Results from skeletal muscle breakdown
    - Release of contents into blood stream - myoglobin, potassium, phosphate, urate and CK
    - Complications include hyperkalaemia and acute renal failure (myoglobi obstructs renal tubules)
    - Causes: trauma, prolonged immobilisation, excessive exercise, drugs and toxins (statins, alcohol), infections (EBV, influenza), inherited muscle disorders
- Pathological Fractures
  - Generalised Bone Disease
    - Osteoporosis
    - Metabolic bone disease - osteomalacia, hyperparathyroidism
    - Paget's disease
    - Myelomatosis
  - Localised Benign
    - Chronic infection
    - Solitary bone cyst
    - Fibrous cortical defect
    - Chondroma
  - Primary Malignant
    - Osteosarcoma
    - Chondrosarcoma
    - Ewing's tumour
  - Metastases
    - Lung
    - Breast
    - Prostate
    - GI
- ATLS Protocol
  - Primary Survey
    - Airway + Oxygen + Check C-Spine
    - Breathing + Ventilation
    - Circulation + Haemorrhage Control
    - Disability (check GCS and pupillary reflexes)
    - Exposure (check and maintain body temperature)
  - Adjuncts (to add life saving information)
    - Radiography: CXR, lateral C-Spine, and pelvis
    - Urinary catheter (unless urethral injury)
    - NGT (unless facial fracture)
    - Oxygen sats and ABG
  - Secondary Survey
    - Once pt is stabilised complete check from scalp to toe
    - More focused imaging and examination
- Fractures
  - # Upper Limb
    - Clavicle: common in young from fall; complications include neurovascular injury and pneumothorax
    - Scapula / Acramion: represent high energy transfer injuries
    - Humerus: for example a child falling from an out stretched hand
    - Distal radius
      - Colles: dorsal angulation and displacement; common in osteoporotic post menopausal women
      - Smiths: forward / palmar displacement
    - Scaphoid: common and easily missed on XR; resulting from falls on the hand; signs are swelling, pain and localised tenderness
    - Typically 6 week healing - half as much in children
  - # Lower Limb
    - Hip / Femur: external rotation, adduction and shortening
      - Intracapsular
        - Just below femoral head
        - Circumflex artery supplies the head via the neck so with fracture there is risk of ischaemic necrosis
        - Total hip replacement
      - Extracapsular
        - Between greater and lesser trochanters
        - Blood supply is not compromised
        - Dynamic hip screw fixation
    - Typically 12 week healing - half as much in children