Adult Pathology
A ten-year-old right-hand dominant boy presents with right elbow pain following a fall from monkey bars whilst playing.

1. Describe the radiograph below (Fig. 1a). What is the diagnosis?
   Answer: Lateral radiograph of a skeletally immature individual demonstrating open physes and a 100% displaced proximal radial epiphysial injury, sitting posteriorly dislocated at 90° to the physis. There is a prominent haemolipo-arthritis, commonly referred to as a “sail sign.”
   Diagnosis: Acute, traumatic right radial head physeal disruption with 100% epiphyseal displacement.

2. How would you manage this patient?
   Answer: Careful counselling of the patient and parents regarding the long-term outcomes of this missed injury. Consideration for the medico-legal aspects of the case. Consent for open reduction +/- epiphyseal excision.

3. This is their radiograph at three month follow-up (Fig. 1b). Describe the findings now.
   Answer: Lateral radiograph demonstrating sclerotic change within the proximal radial epiphysis.

4. What is the diagnosis?
   Answer: Post-traumatic avascular necrosis of the right radial head epiphysis.

5. What is their prognosis?
   Answer: Prognosis is commonly associated with progressive joint remodelling and a progressive deformity. Angular deformity (valgus) is common, especially in a ten-year-old with six years of expected growth remaining. Joint remodelling is not always associated with arthritis or pain. Painless progressive deformity until skeletal maturity is the common sequelae. Complications from this injury include: stiffness, avascular necrosis, premature closing of the growing plate, periarticular ossification, pseudoarthrosis, malunion, radio-ulnar synostosis and cubito valgus.
**Trauma**

A 28-year-old female has presented with a swollen and painful foot after falling down some steps. The radiographs obtained in A&E are shown below (Fig. 2a and 2b).

1. Describe the radiographs.
   Answer: Fracture second to fourth metatarsal necks with dislocation of fifth metatarsal (MT) base.

2. How would you classify this injury?
   Answer: Homolateral: all five MTS are displaced in the same direction. Lateral displacement may also suggest a cuboidal fracture. Isolated: one or two MTS are displaced from the others. Divergent: MTS are displaced in a sagittal or coronal plane and may also involve the intercuneiform area and include a navicular fracture.

3. What is the mechanism of this injury and what are the radiological signs of this injury?
   Answer: Usually caused by indirect rotational forces and axial load through plantar flexed foot. Radiological signs: disruption of the continuity of a line drawn from the medial base of the second MT to the medial side of the middle cuneiform; widening of the interval between the first and second ray; medial side of the base of the fourth MT does not line up with medial side of cuboid on oblique view; MT base dorsal subluxation on lateral view disruption of the medial column line (line tangential to the medial aspect of the navicular and the medial cuneiform).

4. What are the columns in the midfoot?
   Answer: Medial column - includes first tarsometatarsal (TMT) joint. Middle column - includes second and third (TMT) joints. Lateral column - includes fourth and fifth (TMT) joints (most mobile).

5. How would you manage this patient?
   Answer: CT scan revealed dislocation of fifth TMT joint with no disruption of the base of other TMT joint. Reduction of dislocation and stabilisation of fifth TMT was performed. The alignment of second to fourth MT neck fractures was acceptable after reduction.

**Hands**

A 60-year-old farmer presented with painless nodules over the dorsum of his right hand (Fig. 3a and 3b). He had surgery on his left hand a couple of years ago for a progressively increasing contracture of his ring and little finger.

1. What is the diagnosis?
   Answer: Garrod pads – the clinical picture demonstrates thickenning over the dorsum of the proximal interphalangeal joints.

2. What disease are these associated with?
   Answer: Dupuytren's Disease. Thickening of the skin over the knuckles can be also found in repetitive trauma, e.g. violinists, but is most commonly found in Dupuytren's Disease.

3. What does the presence of these nodules signify?
   Answer: The presence of Garrod pads with associated Dupuytren's Disease and with contractures requiring surgery on the contralateral side suggest bilateral disease.

4. What other sites can be involved in this disease?
   Answer: Myofibroblastic tissue can also be found in the foot called Ledderhose disease (plantar fascia) and the penis named Peyronie's disease (dartos fascia).

5. What would the histology of these nodules reveal?
   Answer: Dupuytren's nodules have three phases with differing histology depending on the stage. In the initial stage the tissue is hypocellular and predominantly myofibroblasts. After the proliferative phase in involutional phase there is a high collagen content in the tissue. Finally the third “residual” phase has a fibroblast, myofibroblasts and chronic inflammatory tissue.

**Children's Orthopaedics**

A five-year-old girl presents with a painful swollen left elbow having fallen off a trampoline (Fig. 4a and 4b).

1. What do these radiographs show?
   Answer: Anteroposterior (AP) and lateral of an immature skeleton demonstrating a lateral condyle fracture of the humerus.

2. How would you classify this fracture?
   Answer: The most commonly used classification system is that described by Milch. Type 1 fractures traverse through the capitellar ossification centre, whilst type 2 fractures pass medial to it. The fracture shown is a type 2, which are more common.

3. What are the difficulties in deciding how to treat these fractures?
**Answer:** The fracture line in a type 2 fracture courses through epiphyseal cartilage so cannot be seen on a radiograph. This makes quantifying the degree of displacement and the integrity of the articular surface difficult. It also makes judging the stability of the fracture difficult.

4. What investigations can be performed to provide further information about the degree of fracture displacement and stability?
**Answer:** MRI, arthrogram, internal oblique radiograph and high-resolution ultrasonography have all been reported.

5. How would you classify displacement and stability of these fractures?
**Answer:** Jakob et al categorised displacement into three stages, whilst Finnbogason has classified these fractures in to three groups based on their stability (stable, indefinable risk and high risk).

6. How would you treat this fracture?
**Answer:** Fractures with less than 2 mm displacement and no involvement of the articular surface could be managed in a plaster. Fractures with over 2 mm displacement, and an arthrographically confirmed congruent joint could be managed with closed reduction and fixation. Fractures with displacement of the articular surface should be treated by open reduction and fixation. Fixation could be with K-wires or screws. \(^1\) \(^2\) \(^3\) \(^4\)

7. What are the complications of this fracture?
**Answer:** Lateral condylar overgrowth; cubitus varus; fishtail deformity and tardy ulnar nerve palsy. Avascular necrosis can also occur; so extensive soft tissue stripping should be avoided.

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**Basic Science**

1. Describe the radiographs (Fig. 5a and 5b)?
**Answer:** AP and oblique radiographs centred on the first ray of the right foot. There is destruction of the (MTPJ) with loss of joint space, cyst formation causing expansion of the metaphysis of both the metatarsal and the proximal phalanx, and erosion of the cortices.

2. What are the possible diagnoses?
**Answer:** This radiograph is suggestive of an erosive arthropathy such as gout or pseudogout. Other differentials include inflammatory arthropathies (psoriatic or rheumatoid arthritis) and chronic infection.

3. What is gout?
**Answer:** Gout is a crystal induced arthropathy associated with monosodium urate crystals. This is caused by a build up of uric acid within the blood and tissues, which precipitate out into crystals. Uric acid is produced as part of purine metabolism and is excreted by the kidneys.

Risk Factors:
- Hypertension, diabetes mellitus, renal insufficiency, hypertriglyceridemia, hypercholesterolemia, obesity, male sex, family history, advancing age.

Presentation:
- Peripheral joint monoarthropathy, particularly first MTPJ (pseudogout tends to affect large joints).
- Red, hot swollen joint, painful to range of movement.
- Acute attacks.
- Tophi in soft tissues.

Differential diagnosis include:
- Acute sarcoidosis
- Amyloidosis
- Bursitis
- Calcific periarthritis
- Chondrocalcinosis
- Congenital fructose intolerance
- Conjunctival calcinosus
- Hyperparathyroidism
- Malignant soft tissue tumours
- Milk-alkali syndrome
- Multicentric reticulohistiocytosis
- Pigmented villonodular synovitis
- Psoriatic arthropathy
- Reactive arthritis
- Renal osteodystrophy
- Septic Arthritis
- Spondyloarthropathy
- Rheumatoid arthritis
- Tenosynovitis
- Trauma
- Type IIA hyperlipoproteinemia

4. How is it diagnosed?
**Answer:** Diagnosis is based on exclusion of infection and the finding of monosodium urate crystals on aspirate. Joint aspirate demonstrates light retarding needle shaped urate crystals recognised by polarising microscopy. They are negatively bifringent. Aspiration of tophi demonstrates urate crystals. Serum urate levels may be raised (not diagnostic of gout if raised). Ultrasound of joints can visualise an irregular double contour sign of the crystals on the articular surface. Radiographs classically have maintenance of the joint space and absence of periarticular osteopenia. Lesions have a sclerotic, punched-out border.

5. How is gout treated?
**Answer:** Treatment is divided into acute and chronic. Treating the acute gout attack involves reducing pain and inflammation. The mainstay of treatment is NSAIDS, colchicine and steroids. Starting treatment for hyperuricaemia at the acute phase may prolong the symptoms of the acute gout. Colchicine toxicity has been well documented (glycemc index) symptoms predominantly) and is therefore less commonly used. If NSAIDS are contraindicated intraarticular...
steroid injections are favoured. Chronic gout treatment focuses on reducing purine intact, stopping medications that are associated with causing gout (thiazide diuretics, aspirin) and lowering uric acid levels. Allopurinol (blocks xanthine oxidase lowering production of uric acid), Febuxostat (non purine selective inhibitor of xanthine oxidase) and Lesinurad (selective uric acid reabsorption inhibitor).

References