



# Monoarticular Pain

## 4. Crystal Arthropathies

Miss Joanna Richards MBChB BSc MRCS  
Trauma & Orthopaedic Registrar  
Birmingham Orthopaedic Training Programme



# Module Overview

- Lecture 1: Introduction
- Lecture 2: Septic Arthritis
- Lecture 3: Osteoarthritis
- Lecture 4: Crystal Arthropathies:
  - Case
    - History
    - Examination
    - Investigations
    - Differential diagnosis
  - Gout overview
    - Investigations
    - Management
    - Pathophysiology
    - Risk Factors
    - Complications
  - Pseudogout overview
    - Investigations
    - Management
    - Pathophysiology
    - Risk Factors



# Case

- PC:
  - 50 year old gentleman presents with severe pain in his right first toe
- HPC:
  - Pain awoke from sleep during the night, having developed over night. Noticed associated swelling (not present prior to falling asleep). Described as the most severe pain ever experienced ('even covering feet with bed-sheet hurt'). Nil previous episodes.
- PMHx:
  - HTN
- DHx
  - Hydrochlorothiazide
- SHx
  - Drinks 2-3 pints/day.



# Examination

- General inspection
  - Patient has an increased BMI
- Focused examination
  - Look
    - Swollen first MTPJ and mild swelling over the mid foot
    - Associated erythema; nil tracking
  - Feel
    - Increased heat over joint
    - Tender to palpation
  - Move
    - Reduced range of motion
    - Marked pain on attempted movement



# Examination



# Investigations

- Bloods
  - FBC, U&Es, CRP/ ESR, urate levels
- Joint aspiration
  - Send for MC&S, urgent gram stain and crystals
- Imaging
  - X-ray
  - USS

# Differential Diagnosis

- Gout
- Pseudogout
- Septic arthritis

# Gout

- Acute onset severe joint pain
- Due to accumulation of monosodium urate crystals within the joint
  - Long needle shaped negatively birefringent crystals on microscopy
  - Presence of uric acid crystals does not exclude septic arthritis; can have concurrently
- Normally primary (90%)
  - Idiopathic disorder of nucleic acid metabolism leading to hyperuricaemia and deposition of monosodium urate crystals (purine breakdown product)
- Secondary
  - Associated with disease of high metabolic turnover
    - Psoriasis, haemolytic anaemia, myeloproliferative / lymphoproliferative disorders
  - Diuretics
  - Chronic renal failure





# Gout

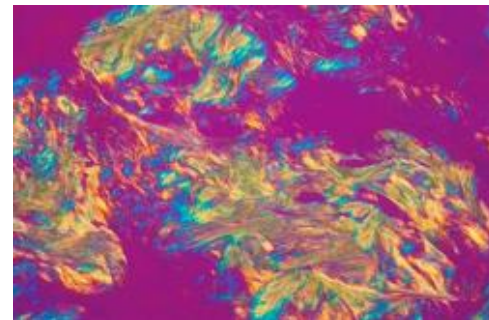
- Symptoms
  - Rapid onset swollen, painful joint +/- fever
    - Typically affects MTPJ of the great toe (50%)
- Signs
  - Swollen, warm, tender joint with erythema and shiny skin +/- chronic tophi
  - May have reduced range of movement due to pain

# Investigations

- Investigations

- Joint aspiration

- negatively birefringent crystals
    - Thin tapered needle shaped intracellular crystals
    - Blue when aligned across direction of polarization
    - Yellow when parallel to red compensator



- Bloods

- Uric acid level
      - Elevated levels are not diagnostic as can be elevated without gout attack (80%)
    - U&Es

- Imaging

- X-ray of affected joint (AP and lateral)
      - Periarticular erosions with sclerotic overhanging borders
      - Soft tissue crystal deposition (tophi)

# Management

- Acute gout
  - Medication: NSAIDs (indomethacin) or colchicine; glucocorticoids if unable to tolerate; reduce thiazide diuretics
  - Life style modification: encourage high fluid intake, reduce alcohol and red meat consumption
- Recurrent gout
  - Medication: Allopurinol (xanthine oxidase inhibitor); NSAIDs,
  - Prophylaxis: colchicine



# Pathophysiology

- Dysfunctional nucleic acid metabolism causes hyperuricaemia
  - Only present in about half of all cases
- Deposition of monosodium urate crystals in the synovium
- Crystals lead to inflammatory response by activating proteases and prostaglandins

# Risk Factors

- Diabetes
- HTN
- Hyperlipidaemia
- IHD
- Obesity
- Chemotherapy
- Male
  - M:F 7-9: 1

# Complications

- Chronic gout
- Recurrent attacks
  - Men aged 46-60 yo
- Osteoarthritis
- Tophi
  - Crystal deposition
- Kidney disease



# Pseudogout

- Metabolic disease causing an accumulation of calcium pyrophosphate dihydrate crystals within the joint space
- Commonly affects the elderly
  - Rarely affects young unless with concurrent disease
- Differences to gout
  - Older patients (>80yo)
  - More proximal joints
  - Positively birefringent crystals



# Pseudogout

- Symptoms
  - Acute onset painful joint, +/- fever
  - Warm, erythematous
  - Commonly knee and wrist
- Signs
  - Swollen joint with warmth, erythema and shiny skin, tender to palpation
  - May be superficial mineral deposits under the skin at affected joints

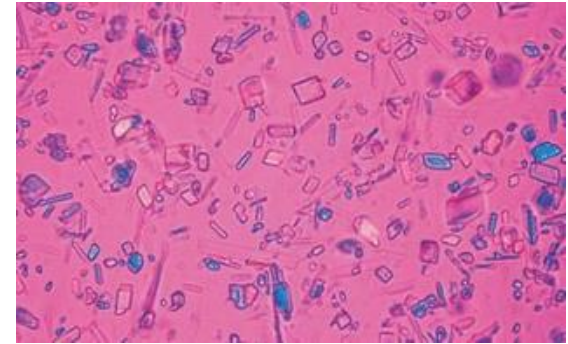


# Investigations

- Investigation

- Joint aspiration

- Weakly positively birefringent short rhomboid- shaped crystals



- Bloods

- Serum  $\text{Ca}^{2+}$ ,  $\text{Mg}^{2+}$ , PTH, Iron studies, Alk phos, FBC ( $\uparrow$ WCC), CRP, ESR,

- Imaging

- Calcification of fibrocartilage structures
      - Chondrocalcinosis
    - Joint degeneration

# Management

- Acute Pseudogout
  - NSAIDs/ paracetamol
  - Splints for comfort
  - Rest
  - Joint aspiration if severe
- Chronic Pseudogout
  - Intraarticular steroid injections
- Prophylaxis/Recurrence
  - Colchicine



# Risk Factors and Associated Conditions

- Increasing age
- Hyperparathyroidism
- Hypomagnesaemia
- Family history
- Haemochromatosis
- SLE
- Gout
- Haemophilia
- Chondrocalcinosis in 7%



# Summary

- Gout and pseudogout are crystal arthropathies
  - Joint aspiration is needed for diagnosis
  - Analgesia and rest
  - Can occur with septic arthritis

# References

- BMJ Best Practice (available online at [bestpractice.bmj.com](http://bestpractice.bmj.com); accessed February 2017)
- Oxford Handbook for the Foundation Programme (2<sup>nd</sup> edition)
- Ritchie Chalmers, C. Parchment Smith, C. MRCS Part A: Essential Revision Notes (book 1) (PasTest 2012)
- [www.orthobullets.com](http://www.orthobullets.com)



Thank you!

Presentation available on  
<https://www.bon.ac.uk>

