

## Epidemiology

- Lifetime risk ~10%
- Peak age of onset is 20 to 50. If 1<sup>st</sup> episode & >60y must consider AAA.
- 3M:1F
- Family history (2x risk)
- Higher socio-economic groups

## Risk factors

- Recurrent UTI
- Hyperuricaemia ( $\pm$  gout) - primary or post-chemo
- Hypercalcaemia
- Hyperoxaluria - e.g. IBD
- Drugs: e.g. carbonic anhydrase inhibitors, topiramate, calcium/vit D, indinavir, sulfadiazine
- People with urinary stasis due to anatomical abnormalities of the pelvi-calyceal system, e.g. medullary sponge kidney, PUJ obstruction, ureteric stricture, VUR, horseshoe kidney
- Deficiency of citrate in the urine
- Cystinuria (an autosomal recessive aminoaciduria)
- RTA

## Presentation

- Classically: sudden severe unilateral loin to groin pain
  - Comparatively mild tenderness of loin or LQ.
  - Pain may  $\rightarrow$  testis, scrotum, labia or anterior thigh.
  - Tends to be more constant than colicky.
  - Writhing in pain rather than the stillness of peritonitis.
- There is usually associated nausea and often vomiting.
- Urinary symptoms (dysuria, frequency, oliguria & haematuria) esp if at VUJ.
- There may be a previous history of renal colic, recent dehydration, or starting a drug.
- High temperature suggests associated pyelonephritis.
- Examine for DDX, e.g. acute appendicitis, ectopic pregnancy, aortic aneurysm.

## Differential diagnosis

- AAA, biliary colic, pyelonephritis, acute appendicitis, ovarian/testicular torsion, pancreatitis, perforated peptic ulcer, drug seeker, Münchausen syndrome.

## Investigations

*Urinalysis:* Blood on initial UA common (85-90%). MSU for M, C & S. pH<5 suggests urate stone. 24hr urine if recurrent (for vol, Mg, Na, Ca, uric acid, citrate, oxalate, PO<sub>4</sub>,  $\pm$  cysteine)

*Bloods:* FBC, UEC, CMP, albumin, uric acid

*Imaging:* Within 24-48hrs of initial episode (to confirm Dx, r/o DDX, & assess any obstruction).

**Plain XR KUB** - Poor sens/spec (~70%), not useful unless following a known radiopaque stone.

**USS or IVP** - may show radiolucent stones & UT dilatation, but sens (<80%) not as good as...

**Non-contrast helical CT-KUB** - Modality of choice (sens/spec>95%). CT may show stone/size directly, or indirectly (hydronephrosis, ureter dilated, perinephric fat stranding).

*Special:* Stone analysis is collected.

## Calculi

### Composition:

- **Ca Oxalate (70-80%)** - radio-opaque, low-Ca diet actually ↑risk as less Ca to bind ingested oxalate in GIT so more oxalate → urine. Thiazides may decrease urinary  $[Ca^{2+}]$
- **Urate (10-15%)** - urine pH<6, radiolucent, prevention by **allopurinol** & ↑fluid intake
- **Struvite ( $MgNH_4PO_4$ )** - Associated with urea-splitting bacteria e.g. Proteus & Klebsiella.
- **Ca  $PO_4$**  - associated with ↑PTH & RTA.
- **Cystine** - Most likely to cause ESRF. More likely if aged<30y. Large recurrent stones. Cystinuria: AR cond of ↓tubular reabs of COAL amino acids (cys, orn, arg, lys). Rx: very high urine output, **penicillamine** + urinary alkalinisation.

### Size/Passage rate

- 80-90% pass if ≤5mm, <15% pass if >5mm.

### Impaction Site

- VUJ, PUJ, bladder orifice & pelvic brim most common sites for impaction.

## Management

### Analgesia.

- Opioids (faster onset): **Morphine** 2.5mg rpt IV titrated to pain or **paracetamol/codeine**
- NSAIDs (slower onset): **indomethacin** 100mg PR, diclofenac 50mg PO. IM **diclofenac** or **ketorolac** can be used but little advantage.
- Antiemetic if severe nausea and vomiting
- **Hyoscine** (Buscopan®) often used but no proven benefit
- H1 anatagonists may have a role, studies awaited.

*Antibiotics:* if UTI suspected - **ampicillin** 1-2g IV q6h + **gentamicin** 4-6mg/kg IV od

*Fluids:* Enough to establish good urine flow. If excessive can ↑pain if partially obstructed.

*α1 blocker:* **tamsulosin** (Flomax®) 0.4mg od may be useful to enhance ureteric stone expulsion.

## Disposition

### Short stay ward:

- Failure to respond to analgesia within 4hr
- Stone ≤5mm in distal ureter

### Urology Admission:

- Obstruction, UTI, anuria/renal failure, or single functioning kidney

### Surgery

- Stenting (JJ) or nephrostomy catheter to relieve acute obstruction
- Extracorporeal shock wave lithotripsy (ESWL)
- Percutaneous nephrolithotomy (PCNL) (cysteine, stones>2cm, and staghorn calculi)
- Ureteroscopy + YAG laser.
- Open surgery (1-5%) where ESWL, PCNL, and ureteroscopy/laser failed

## Complications

- Deterioration of renal function, sepsis, and ureteric stricture.

## Prognosis

- 60% stones that pass spontaneously will do so within 4 weeks of onset of symptoms.
- 50-70% recurrence rate in next 10yr.
- Recurrence risk factors: First attack <25yo, single functioning kidney, predisposing condition, abnormal renal tract