Stone

CONTENT	PRECIPITATES WITH	X-RAY FINDINGS	CT FINDINGS	URINE CRYSTAL	NOTES
Calcium	Calcium oxalate: hypocitraturia	Radiopaque	Radiopaque	Shaped like envelope A or dumbbell	Calcium stones most common (80%); calcium oxalate more common than calcium phosphate stones. Hypocitraturia often associated with ↓ urine pH. Can result from ethylene glycol (antifreeze) ingestion, vitamin C abuse, hypocitraturia, malabsorption (eg, Crohn disease). Treatment: thiazides, citrate, low-sodium diet.
	Calcium phosphate: ↑ pH	Radiopaque	Radiopaque	Wedge-shaped prism	Treatment: thiazides.
Ammonium magnesium phosphate	↑ pH	Radiopaque	Radiopaque	Coffin lid B	Also known as struvite; account for 15% of stones. Caused by infection with urease ⊕ bugs (eg, *Proteus mirabilis*, *Staphylococcus saprophyticus*, *Klebsiella*) that hydrolyze urea to ammonia → urine alkalinization. Commonly form staghorn calculi C. Treatment: eradication of underlying infection, surgical removal of stone.
Uric acid	↓ pH	RadiolUcent	Minimally visible	Rhomboid D or rosettes	About 5% of all stones. Risk factors: ↓ urine volume, arid climates, acidic pH. Visible on ultrasound. Strong association with hyperuricemia (eg, gout). Often seen in diseases with ↑ cell turnover, such as leukemia. Treatment: alkalinization of urine, allopurinol.
Cystine	↓ pH	Radiolucent	Sometimes visible	Hexagonal E	Hereditary (autosomal recessive) condition in which Cystine-reabsorbing PCT transporter loses function, causing cystinuria. Transporter defect also results in poor reabsorption of Ornithine, Lysine, Arginine (COLA). Cystine is poorly soluble, thus stones form in urine. Usually begins in childhood. Can form staghorn calculi. Sodium cyanide nitroprusside test ⊕. "SIXtine" stones have SIX sides. Treatment: low sodium diet, alkalinization of urine, chelating agents if refractory.

→ Presentation :

Hx —> flank pain : SOCRATES
—> LUTSH, Nausea/Vomiting => as associated symptoms
—> microscopic hematuria.

PE —> Vitals, Abdomenal, kidney , Groin

→ Investigations:

Basic laps : CBC, KFT, UA, UC
Imaging —> non C CT ~ **gold standard**
—> KUB ~ classify the stone& follow up
—> US
—> MRI

→ Typical
→ pregnant, child

→ RF: M>F, age 20-30, low water and Ca+ intake, IBD (high oxalate), high Na+ and protein, chemo (increase uric acid) steroid (high Ca+), UTI, hot climate, genes

→ DDx: aortic dissection, MI, appendicitis, ectopic pregnancy, muscle spasm, testicular/ ovarian torsion.

→ Indication of UTCT :

Intractable pain, severe N/V , pending sepsis, Leukocytosis, AKI, Single kidney , special pt (pilots)

→ Not respond to Fluid → S. Shock Sys ≤ 60 - Need Vasopressor

↳ Fever, hypoT. <100, Altered Mental.S, Tachypnea

→ Treatment:

- IV fluid + Analgesia
- Urgent —> Decompression —> Nephrostomy tube
  —> Uretric stent (by double J cath)

Indications for urgent Tx
Same as UTCT + obstructive stones OR Bilateral obstructions

Contraindicationsf of Extracorporial
1 .Radiolent
2 Obese,Pregnant
3 .Bleeding disorders

- Definitive
  ~ depend on the site , size, kub (R.lucent or opaque) , component

➔ Conservative —> hydration + a blocker → wait 2 months
➔ Chemical dissolution
➔ Extracorporial —> **ESWL > extracorporeal shock wave lithotripsy ....** > 2cm any where except lower.c
➔ Intracorporial —> **Ureteroscopy with laser ablation** or **pneumatic type** pelvicalyceal stone, < 2 cm
(Rigid in ureter, flexible in kidney)
—> **Percutaneous nephrolithotomy** .... Stone > 2 cm , or in lower calyx → only lower
—> **Open surgery (open Pyelolithotomy)** .... Staghorn stone or > 4 cm.

Kidney:

All renal stone should be removed even if there is no pain—> lead to mortality due to (UTI, sepsis , absecc)
<1.5 cm **ESWL**
>1.5 **ESWL & double J**
- If failed go for:
  1- flexible uretroscopy with laser
  2-PCNL ={percutaneous nephrolithotomy}

Ureter: fever= infection proximal to the stone —> emergency urine & IV fluid & antibiotic, Nephrostomy if fever doesn't resolve within hours .....

Management: start with NSAID, opioid, alpha blockers & watchful waiting:
if it was small pass within days- weeks.
If > 2months {alpha blocker helps in passage}

- <5 mm/ No JJ: medical therapy and wait for 1-2 weeks, If failed-> definitive Tx
- >5mm JJ or nephrostomy (pt. Unwell or obstructive pyelonephritis)

definitive Tx:
1- upper 1/3: **ESWL**/ **flexible ureteroscopy/ lithotripsy** (Pneumatic)
2- Middle 1/3: **rigid ureteroscopy**
3- lower 1/3: **ureteroscopy** then begin with **ESWL**

Bladder : struvite or uric acid, men >50 yr. (BPH) -must be removed due to increased risk for SCC

-management if :
-<2 cm **endoscopic cystolitholapaxy**
->2 cm **open cystolitholapaxy**

Urethra: Small tone clear spontaneously

-Plugged large stone needs removal
-> external meatus : by **forceps**
-> up : **push** it back to bladder (folly's) then Tx as a bladder stone