

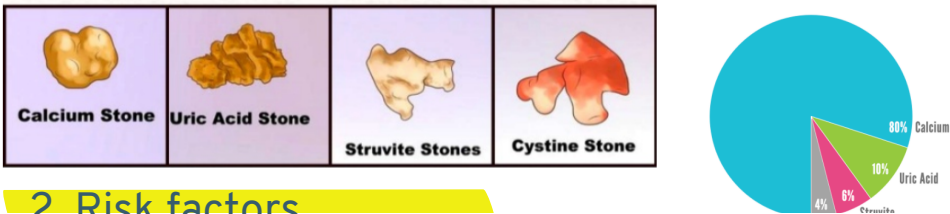
The ABCs of

Urolithiasis

UNDERSTANDING THE FACTS BEHIND

1. Types of stones/ calculi

Types	Characteristics
Calcium <ul style="list-style-type: none">- Oxalate- Phosphate	<ul style="list-style-type: none">• Most common• Urine contains low levels of citrate, high levels of calcium, and oxalate• Citrate has protective role against formation of stones
Uric acid	<ul style="list-style-type: none">• Increased excretion of uric acid & low urine pH• Caused by high purine diets, gout, IBD genetic diseases and diabetes
Cystine	<ul style="list-style-type: none">• Uncommon• Generally caused by cystinuria and low urinary pH
Struvite	<ul style="list-style-type: none">• Infectious stones, often caused by UTIs• Bacteria split urea molecules into ammonium and CO2 → raising urine pH to alkaline → bacteria adherence



2. Risk factors

Modifiable	<ul style="list-style-type: none">• Diet• Dehydration• Hyperparathyroidism• Hypervitaminosis D• Urinary stasis• Milk-alkali syndrome (hypercalcaemia)
Non-modifiable	<ul style="list-style-type: none">• Age (during 4th - 6th decade of life)• Male gender• Cystinuria (inherited disease)• Gout• idiopathic

3. Clinical features (depends on site)

- Obstruction
 - pelvic-ureteric junction, in the ureter, at bladder neck (rarely at ext. Urethral meatus)
- Ulceration
 - Of calyces, pelvic mucosa, bladder → haematuria
- Chronic infection
 - Leads to pyelonephritis, pyonephrosis, urosepsis, kidney failure
- Pain
 - Renal
 - Asymptomatic unless stone is lodged in pelviureteric junction → hydronephrosis and infection → pyonephrosis
 - Vague flank pain
 - Large-branched staghorn calculi in bilateral kidneys → chronic renal failure
 - Ureter
 - Severe symptoms even by smallest stone as ureter is narrow
 - Classic ureteric colic pain: severe, intermittent, loin-to-groin
 - Stone at VUJ → frequency, urgency, dysuria
 - Bladder
 - May be asymptomatic
 - Cause irritative urinary symptoms: frequency, urgency
 - If infected → haematuria, dysuria, fever

4. Investigations

Haematological	<ul style="list-style-type: none">• Mild leukocytosis• Serum Ca (if raised perform PTH)• LFTs (albumin)• Serum uric acid
Urine tests	<ul style="list-style-type: none">• Dipstick• UFEME• Urine culture/ sensitivity• 24hr urine collection of metabolic profile• Haematuria (microscopic or gross)• pH of urine (acidic vs alkaline stones)
KUB X-ray	<ul style="list-style-type: none">• Able to see radio-opaque stones
Intravenous urogram (IVU)	<ul style="list-style-type: none">• Detects radiolucent stones (uric acid stones)
CT KUB	<ul style="list-style-type: none">• Non contrast
US KUB	<ul style="list-style-type: none">• Evidence of kidney stones or complications (hydronephrosis)

5. Management (depends on site)

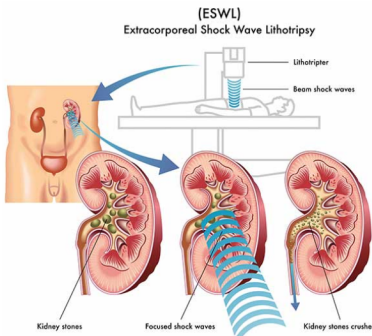
- Conservative
 - Calculi <5mm passes spontaneously unless impacted
 - Alpha blocker (tamsulosin) if stone <10mm
 - Hydration
 - Pain management
 - Diet modifications
 - Decrease intake of purine/protein/oxalate/salt-rich foods
- Surgical intervention
 - Indication (7s)
 - Size, site, symptoms, stasis, stuck, sepsis, social
 - Complications
 - Haematoma, UTI, ureteric injury/ perforation

Summary of treatment modalities:

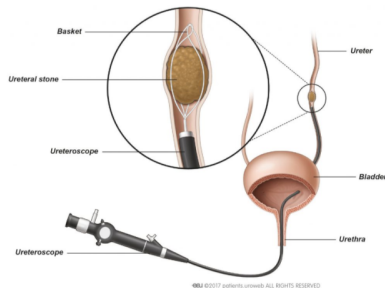
Location	Size	Treatment
Renal	< 5mm	Conservative management unless symptomatic/persistent
	5-10mm	ESWL
	10-20mm	Either ESWL or PCNL
	> 20mm	PCNL
Upper ureter	< 5mm	Conservative management unless symptomatic/persistent
	5-10mm	ESWL
	> 10mm	URS with lithotripsy
Middle ureter/ Distal ureter	< 5mm	Conservative management unless symptomatic/persistent
	> 5mm	URS with lithotripsy ESWL
Bladder	< 30mm	Cystolitholapaxy
	> 30mm	Open cystolithotomy (also if there are multiple stones)

6. Lists of treatment

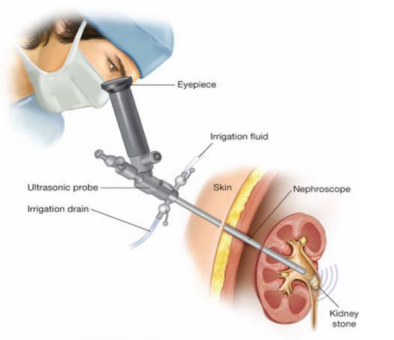
- Extracorporeal shock wave lithotripsy (ESWL)



- Ureterorenoscopy (URS) lithotripsy



- Percutaneous nephrolithotomy (PCNL)



- Cystolitholapaxy

