



Miss Rashmi Singh

- Consultant Urological Surgeon

Stones, Moans and Groans

A Guide to the Assessment and Management of Renal Colic

Kidney stone disease is common with a prevalence of 2-3% and an approximately 10% lifetime risk of developing a stone. Risk is affected by age, ethnicity and sex with a slight increased risk in males. It is a disease of young people, typically aged 20-50 and in recurrent stone formers it can have significant impact on their quality of life and ability to work.

Renal Colic

Assessment and Diagnosis

Renal colic occurs when a stone migrates from the kidney into the ureter and is classically associated with a sudden onset of severe pain usually originating in the loin, radiating down to the groin/testicle or labia. The pain may be associated with nausea, vomiting and restlessness with an inability to get comfortable. If the stone is in the distal ureter, patients often experience lower urinary tract symptoms such as frequency and urgency of urine.

Fever is a worrying sign and may indicate a potentially obstructed/infected system. This is a urological emergency and needs urgent referral for consideration of surgical drainage of the upper tract. Many patients often have a previous history of stones and will recognize the symptoms immediately. Whilst some patients may present to their GP with an acute episode, most often take themselves directly to A&E due to the sudden and severe nature of the pain. Differential diagnoses to consider are shown in Table 1.

Differential diagnosis of renal colic:

Table 1
Aortic aneurysm
Pyelonephritis
Appendicitis,
Biliary colic
Bowel obstruction,
Diverticulitis
Mechanical back pain
Testicular torsion
Gynaecological problems e.g. torsed ovarian cyst, ruptured ectopic



Investigations

Baseline investigations should include renal function and inflammatory markers (CRP and white cell count). Urinalysis is very important particularly looking for haematuria (90% sensitivity in renal colic) and presence of leucocytes or nitrites, which may suggest associated infection. Urine microscopy and culture should be requested if this is the case.

Non-contrast CT KUB (kidneys, ureters, bladder) has now replaced IVU as the investigation of choice for renal colic (Figure 1). Whilst renal USS can be used, the sensitivity for ureteric stones is limited and very operator dependent. However, it remains the first line investigation in pregnant females and children. CT has a sensitivity of 95% and specificity of 98% for renal/ureteric stones and also offers the potential advantage to pick up alternate pathology. Unlike IVU, it avoids the risks associated with intravenous contrast, hence it is safe in patients with contrast allergy or renal impairment. Low dose protocols have reduced the radiation dose of CT to that of an IVU. A baseline KUB X-ray at the same time is recommended as this then facilitates radiological follow-up of the stone if it is radio-opaque.



Management

Patients who should be considered for urgent urological assessment or hospital admission are shown in Table 2.

Table 2
Presence of significant fever with symptoms of colic
Solitary kidney
Transplant kidney
Renal impairment
Pregnancy
Uncontrolled pain
Diagnostic uncertainty

Conservative

Pain relief is the priority. NSAIDs e.g. Diclofenac 50-100mg given orally or parenterally are very effective in acute colic and have better analgesic efficiency than opiates e.g. pethidine which can be associated with a higher rate of vomiting. They can be used in combination with paracetamol or codeine-based analgesia. An anti-emetic may also be required. If NSAIDs are contraindicated then morphine is preferable to pethidine in the acute situation.

In recent years medical expulsive therapy has been used extensively in the management of renal colic. Several studies have shown that patients with distal < 10mm ureteric stones treated with alpha-blockers e.g. tamsulosin or nifedipine are likely to pass their stone more quickly, with fewer colic episodes and less analgesia requirement than those on placebo. In one meta-analysis, patients given medical expulsive therapy had a 65% (relative) greater likelihood of stone passage than controls. Alpha blockers work by promoting smooth muscle relaxation in the ureter. However, a recent multi centre placebo controlled randomised controlled trial (SUSPEND trial) in over 1100 patients, showed no difference between active treatment and placebo and between nifedipine and tamsulosin in

reducing the need for further treatment to achieve stone clearance at 4 weeks in patients undergoing expectant management. Nifedipine was also associated with significant side effects. Interestingly despite the myth that increasing oral fluids will promote stone passage, there is no published evidence to support this in acute colic and patients should be advised to simply maintain a fluid intake of 2L per day.

In one meta-analysis, patients given medical expulsive therapy had a 65% (relative) greater likelihood of stone passage than controls. Alpha blockers work by promoting smooth muscle relaxation in the ureter. They are a reasonable adjunct to analgesia provided the patient is counseled regarding potential side effects and that the drug is being administered off-label.

Interestingly despite the myth that increasing oral fluids will promote stone passage, there is no published evidence to support this in acute colic and patients should be advised to simply maintain a fluid intake of 2L per day.

The majority of ureteric stones will pass spontaneously. Stone passage rates are influenced by the size and position of the stone. A meta-analysis showed an overall passage rate of 68% for stones at least 5 mm in diameter and 47% for stones of 5-10 mm. Therefore observation is reasonable management in a patient whose pain is well controlled, with no clinical features of sepsis, normal renal function and who is willing to attend for regular follow up to monitor progress.

The majority of ureteric stones will pass spontaneously. Stone passage rates are influenced by the size and position of the stone.

Beware the silent, asymptomatic obstructing stone, which can unfortunately result in permanent loss of function of the kidney. It is essential therefore that all patients presenting with renal colic have some form of repeat imaging and clinical review within 4-6 weeks of the acute episode to confirm stone passage.

Intervention

Absolute indications to intervene are infection/obstruction (pyonephrosis), renal failure e.g. in a patient with a solitary kidney or bilateral obstruction. Relative indications are patient choice e.g. social reasons or the need to travel necessitating early intervention, recurrent or ongoing pain and failure of stone progression over a period of observation. There are also a number of occupations e.g. airline pilots that require absolute stone removal before the patient can resume work.

Treatment options lie between non-invasive Extracorporeal Shock Wave Lithotripsy (ESWL) and surgical intervention –ureteroscopy (URS) and stone removal/laser fragmentation. Both treatments have high success rate for all ureteric stones (82-93%) depending on size and position of stone. Ureteroscopy appears to have higher stone free rates for larger stones but is associated with more complications when compared to lithotripsy. The decision is influenced by patient factors, stone factors and local expertise/treatment availability.



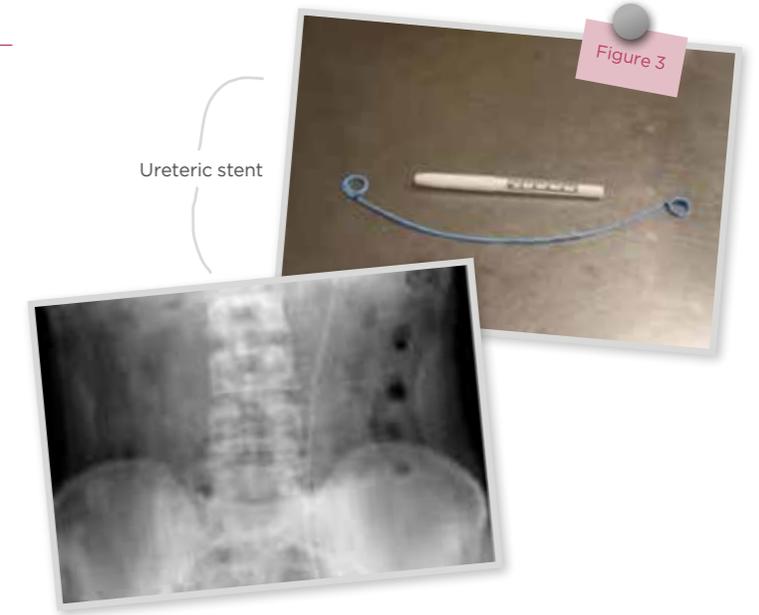
Lithotripsy

Lithotripsy therapy uses ultrasound shock waves which are transmitted from an external generator through the tissues to the target stone. The shockwave is focused on the stone using ultrasound or x-ray guidance allowing fragmentation into fine “dust” which can then pass spontaneously in the urine.

Lithotripsy is an outpatient procedure performed usually with just oral analgesia though some patients may require/prefer a short acting sedative. Depending on the density/size of the stone, more than one treatment may be required. Complications include pain related to passage of fragments, haematuria and rarely peri-nephric haematoma. ESWL is contraindicated in pregnancy, patients with an aortic aneurysm or patients on anti-coagulant/anti-platelet drugs.

Ureteroscopy and Holmium Yag laser lithotripsy

In recent years there have been significant technological advances such that fine caliber flexible and rigid uretero-renoscopes with high quality optics are available for the endoscopic treatment of stones in the ureter and pelvi-calyceal system using laser fibres and baskets (Figure 2).



URS is usually performed under GA and as a day case. Recovery is short and post-operative symptoms are mainly irritative LUTS and haematuria associated with instrumentation. Major complications are rare and include urosepsis and ureteric injury. Patients may be left with an internal ureteric stent post procedure (Figure 3). This is usually only temporary but patients can experience loin pain, bladder spasms, strangury of urine and haematuria in the presence of a stent. These symptoms mimic UTI but do not usually respond to antibiotics.

Endoscopic treatment of stones in the ureter using laser fibres and baskets.

Anticholinergics or anti-spasmodics may provide symptomatic relief. The definitive solution is to remove the stent as soon as possible.

Stone prevention

*Advice for
stone formers*

Unfortunately stone recurrence rates are high after a first presentation- up to 35% at 5 years and 50% at 10 years. Therefore metabolic evaluation, patient education and lifestyle modification play a crucial role in stone prevention. Patients are usually very keen to avoid a further episode and seek advice.

After a first episode of ureteric colic it is recommended to perform the following:

- Urine dipstick
- Serum urea, creatinine, calcium and uric acid
- Stone analysis if sample available

A finding of hypercalcaemia requires further investigation to exclude causes such as hyperparathyroidism (classically associated with renal stones, abdominal groans and psychic moans) and even underlying malignancy. Recurrent stone formers, patients with complex or extensive stones, patients with a strong family history and children may require a more detailed metabolic evaluation which includes a 24 hour urine collection, with possible referral to a specialist metabolic clinic.

General prevention measures are summarized in Table 3. Despite the fact that most kidney stones are calcium based, it is important not to eliminate calcium from the diet as it is needed to bind to dietary oxalate in the gut. Patients should be told that elimination of dairy products from the diet can actually increase the risk of oxalate stones.

Oxalate rich foods such as rhubarb, spinach, beetroot, chocolate, cola, black tea and nuts should be reduced in the diet.

Apart from these general dietary measures, other specific metabolic manipulations are often required e.g. urinary alkalinisation with potassium citrate in those who form uric acid stones. Citrate is an inhibitor of stone formation and increasing citrus juices/fruits in the diet can be helpful.

Table 3	
Fluid	2.5-3.0 L/day especially water Circadian drinking Aim for urine output of 2.0-2.5 L/day
Nutrition	Balanced diet Low salt Normal calcium Low oxalate High vegetable/fibre intake Restrict animal protein especially red meat
Lifestyle	Maintain normal BMI Adequate physical activity Balancing of excessive fluid loss

Key Messages

- Non contrast CT KUB is the imaging modality of choice for diagnosing renal colic
- NSAIDs should be used as first line analgesia in acute colic
- Evaluate for sepsis in patients with renal colic. These patients may need urgent hospital admission for drainage
- Conservative management with analgesia +/- alpha blockers should be considered in cases of uncomplicated colic
- Indications for intervention include ongoing pain, renal impairment, failure of stone progression or large stones unlikely to pass spontaneously
- Stone recurrence rates are high. Dietary and fluid modification and basic metabolic assessment is important in stone prevention