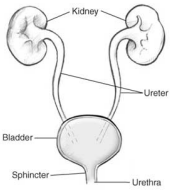


Urolithiasis

Monash Children's Hospital

What is it?

Urolithiasis refers to 'stones' that are found within the urinary tract: that is kidneys, ureters, bladder or urethra. The term is of Greek origin:

- Uro = urinary tract
- Lithiasis = stones

The 'stones' are formed from clusters of tiny crystals of substances in the urine.

Background

Urine contains many different substances, which do not normally cause problems. When the balance of substances is disturbed; from dehydration, infection, stasis or a metabolic disorder, tiny crystals can form in the urine. These can join together to form larger clumps, or stones.

Who?

Urolithiasis is uncommon in children. Some children have underlying conditions that make them more likely to develop stones.

The sorts of stones children form are similar to those in adults. Most commonly, stones form due to 'super-saturation' of substances in the urine – that is, the substance is too concentrated to remain dissolved in the urine.

Sometimes, there is an underlying condition that increases the risk of stone formation:

- structural abnormalities causing impaired drainage of urine
- certain types of urinary tract infection
- metabolic disorders where too much of a substance is excreted into the urine
- some medications used for premature babies or other conditions

How does it present?

Children with urolithiasis may present with infection, haematuria (blood in the urine), pain, failure to thrive or passage of stones. Stones may also be found incidentally on investigations for other conditions.

What tests are performed?

Ultrasound

An ultrasound scan is the first test used to identify urolithiasis. It provides information regarding the number and size of stones ("stone burden"), stone location and any associated problems such as dilatation or blockage.

X-ray

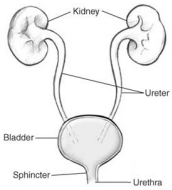
This can help assess stone composition and treatment planning. Not all stones can be seen on X-ray, but when they can, this is a useful method of following results of treatment and recurrence.

Urinary tests

Analysis of urine is a very important part of the investigation for urinary tract stones. Urine culture for infection should be performed first, even before the stones are treated. Following clearance of stones, urine is analysed for volume and composition, helping identify underlying metabolic disorders and targeting ways of reducing chance of recurrence.

Blood tests

Blood tests looking for underlying metabolic disorders will be ordered under guidance of a paediatric nephrologist with particular interest in urinary stone disease.



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What are the treatment options?

The treatment for urinary tract stones in children is very similar to the treatment of adults. The treatment of each stone will depend on where it is in the urinary tract, the stone burden and the likely or known stone composition. The size and age of the child also impacts treatment options.

Multiple treatments may be necessary to clear the stones. Treatment should be carried out in a specialised facility with the expertise and equipment to treat the stones in the best manner possible. Modalities include:

Extra-corporeal Shock-Wave Lithotripsy – ESWL

ESWL uses special sound waves generated outside the body and focussed on the stone, to break it into small pieces. These pieces are then expelled by the patient, along with the flow of urine.

Uretero-pyeloscopy

A fine telescope can be passed up the urinary tract from below (through the urethra) to stones in the bladder, ureter or kidney; fragmenting the stones with laser or mechanical devices.

PerCutaneous NephroLithotomy – "PCNL"

PCNL involves creating 'key-hole' access to stones in the kidney, through a tiny incision in the back. This can allow a larger telescope to be placed, directly into the kidney, allowing treatment of large stone burdens quickly.

Open surgery

Rarely, an open operation is needed to remove very large stone burdens or to correct underlying structural abnormalities of the urinary tract.

It is very important to try to avoid stones forming again. It is important to drink lots of water. Some children may need to change their diet, or take medications to help prevent stone recurrence.

What are the outcomes?

Several treatment episodes, utilising more than one form of treatment, may be needed to clear large stones burdens.

Children who form urinary tract stones are at high risk of forming more stones during their life. While treatment of any underlying cause is very important, prevention of stone recurrence is mandatory. Regardless of the cause, the single most effective preventative measure is urinary dilution. This requires a large intake of water. Your paediatric urologist or renal physician (kidney specialist) can give you guidance on how much is sufficient. As a rough guide, if the urine is almost colourless, it is dilute. If it has more than a trace of colour, it is too concentrated.

If the urolithiasis has been related to infection, antibiotics may be prescribed, to avoid infection after the event.

If there is an underlying abnormality in the urine filtration, specific medications, diet and fluid intake will be needed to reduce the chance of recurrence.

If there is an underlying abnormality of the urinary tract, this may require surgery.

What is the follow-up?

Children who have had urolithiasis will require follow-up with their paediatric urologist to ensure complete removal of all stones.

Children who have had urolithiasis should also have consultation with a paediatric nephrologist to look for underlying metabolic abnormalities, and ongoing follow-up and monitoring if this is found.