

Kidney stones

Kidney stones occur when salts in the urine form a solid crystal. These stones can block the flow of urine and cause infection, kidney damage or even kidney failure. Between four and eight per cent of the Australian population suffer from kidney stones at any time. They can vary in size and location. Kidney stones are sometimes called renal calculi.

Most kidney stones can be treated without surgery. However, pain can be so severe that hospital admission and very strong painkillers may be needed. Always seek immediate medical attention if you are suffering strong pain.

The risk of kidney stones is about one in 10 for men and one in 35 for women. After having one kidney stone, the chance of getting a second stone is between five and 10 per cent each year. Up to half the people with a first kidney stone will get a second stone within five years. After five years the risk declines. However, some people keep getting stones their whole lives.

Types of kidney stones

There are four major types of kidney stones:

- Stones formed from calcium not used by the bones and muscles, combined with oxalate or phosphate – these are the most common kidney stones.
- Stones containing magnesium and the waste product ammonia – these are called struvite stones and form after urine infections.
- Uric acid stones – these are formed when there is too much acid in the urine.
- Cystine stones – these are rare and hereditary.

Kidney stones may be caused by many factors

Often the cause of kidney stones is difficult to find. The likelihood of developing a kidney stone increases with age and family history. Urinary tract stones tend to be more common in Aboriginal children living in remote and arid conditions.

A number of factors can contribute to stone formation. These can include:

- Excess calcium, phosphate, oxalate and uric acid in the urine
- A lack of chemicals called stone inhibitors in the urine
- Some medications
- Not drinking enough fluids, causing concentrated urine and a higher chance of crystal formation
- Ongoing urine infections
- A family history of stone formation
- Obesity
- Rare inherited conditions
- Anatomical abnormalities.

The most common kidney stones, containing calcium, are usually caused by:

- Higher than normal bowel absorption of calcium or oxalate
- Higher than normal escape of calcium phosphate or oxalate into the urine
- Overactivity of the parathyroid glands in the neck.

A small number of kidney stones are linked to:

- A problem with your body's ability to break down and use chemicals – for example, people with gout have a high level of uric acid in the urine

- A structural or metabolic problem of the kidney.

Symptoms

Many people with kidney stones have no symptoms. However, some people do get symptoms, which may include:

- A gripping pain in the back (also known as 'renal colic') – usually just below the ribs on one side, radiating around to the front and sometimes towards the groin. Sometimes the pain is severe enough to cause nausea and vomiting
- Blood in the urine
- Shivers, sweating and fever – if the urine becomes infected
- Small stones passing out in the urine like gravel, often caused by uric acid stones
- An urgent feeling of needing to urinate, due to a stone at the bladder outlet.

Diagnosis

Many stones are discovered by chance during examinations for other conditions. Further tests may include:

- Ultrasound
- CT scans
- X-rays including an intravenous pyelogram (IVP), where dye is injected into the bloodstream before the x-rays are taken.

The doctor may ask for a blood test or a 24-hour urine collection to help find out what is causing the stones and how to prevent them in the future.

If you pass a stone, collect it and take it to your doctor for analysis. Analysis of a stone is very useful.

Kidney stones can cause minor or severe problems

Kidney stones can range in size from a grain of sand to that of a pearl or even larger. They can be smooth or jagged and are usually yellow or brown. A large stone may get stuck in the urinary system. This can block the flow of urine and may cause strong pain.

Kidney stones can cause permanent kidney damage. Stones also increase the risk of urinary and kidney infection, which can result in germs spreading into the bloodstream.

Treatment

Most kidney stones can be treated without surgery. Ninety per cent of stones pass by themselves within three to six weeks. In this situation, the only treatment required is pain relief. However, pain can be so severe that hospital admission and very strong painkillers may be needed. Always seek immediate medical attention if you are suffering strong pain.

Small stones in the kidney do not usually cause problems so there is often no need to remove them. A doctor specialising in the treatment of kidney stones is the best person to advise on treatment.

Stones may need to be removed if they:

- Don't pass by themselves
- Block the urine flow
- Grow larger
- Cause bleeding or infection.

Kidney stone removal

Sometimes kidney stones need treatment, which can include:

- **Ureteroscope or endoscope removal** – some kidney stones can be removed using an instrument inserted into the urethra (where urine empties from the bladder) and through the bladder to where the stone is located.
- **Percutaneous nephrolithotomy** – a small cut is made in your back and a special instrument is used to remove the kidney stone.

- **Extracorporeal shock-wave lithotripsy (ESWL)** – ultrasound waves are used to break the kidney stone into smaller pieces, which can pass out with the urine. It is used for stones less than 2cm in size.

Treatment with drugs

Some types of stones (such as cystine and uric acid stones) can be dissolved using medication. If stones are associated with infection, both the stones and the infection must be completely cleared to avoid future stones and strenuous effort is needed to prevent further infection.

Calcium-based stones cannot be dissolved with drugs or by drinking larger quantities of water. However, in most people they can be prevented from recurring.

Preventing kidney stones

For nearly all forms of kidney stones, the best way to prevent stone growth or recurrence is to drink large amounts of fluids. This produces a high urine volume in which the stone chemicals can dissolve.

People with recurrent calcium-based stones should be considered for thiazide and thiazide-like therapy, which has been shown to be highly effective in prevention, particularly in those people with increased amounts of calcium in the urine. Oral citrate therapy is effective in preventing recurrence, particularly if the amount of citrate in the urine is low.

For people who form stones and have a high level of uric acid in their urine or make uric acid stones, the drug allopurinol can lower the risk of a stone re-forming.

Avoiding a recurrence

If you have had one stone, some tips that may help to prevent a second stone forming include:

- Consult with your doctor to find the cause.
- Treat urinary infections quickly and properly.
- Drink plenty of fluids, ideally water, to keep your urine volume at or above two litres a day. This may mean drinking up to three litres of fluid a day, including drinking at night. Drinking fluids can halve your risk of getting a second stone by lowering stone-forming chemicals.
- Avoid drinking too much tea or coffee.
- Citrus juices (particularly orange, grapefruit and cranberry) may reduce the risk of some stones. Mineral water cannot cause kidney stones because it contains only trace elements of minerals.
- Reducing salt intake may lower the risk of calcium-based stones.
- Avoid very high and very low calcium intake. A low calcium diet may be associated with an increased rate of recurrent stones.
- Don't drink more than one litre each week of drinks with phosphoric acid, which is used to flavour carbonated drinks such as cola and beer.

Always talk to your doctor before making any changes to your diet.

Where to get help

- Always call an ambulance in an emergency Tel. 000
- Your doctor
- Your local community health centre
- Nurse-on-Call Tel. 1300 606 024 – for expert health information and advice (24 hours, 7 days)
- Kidney Health Australia Information Line Tel. 1800 4 KIDNEY (543 639), TTY 1800 005 881

Things to remember

- The lifetime risk of developing kidney stones is one in 10 for men and one in 35 for women.
- New techniques can remove kidney stones without the need for an operation.
- Drinking plenty of suitable fluids such as water can help prevent a recurrence of kidney stones.

Want to know more?

Go to More information for support groups, related links and references.

This page has been produced in consultation with, and approved by:

Kidney Health Australia

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