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Kidney Stones

Kidney stones are hard stones that can cause severe pain in your side along with blood in your urine and nausea or vomiting. You are more likely to develop kidney stones if you eat a Western diet, don't drink enough fluids or you are overweight. Once you have had one episode they are likely to recur but there are several treatment options available.

What are kidney stones?

Kidney stones are hard stones that can form in the kidney, in the tube (the ureter) draining urine from the kidney, or in the bladder.

Our kidneys remove many different chemicals from our body. This is really important to keep us healthy. These chemicals are passed from our kidneys to our bladder and out of our body. Occasionally these chemicals can join together and form kidney stones

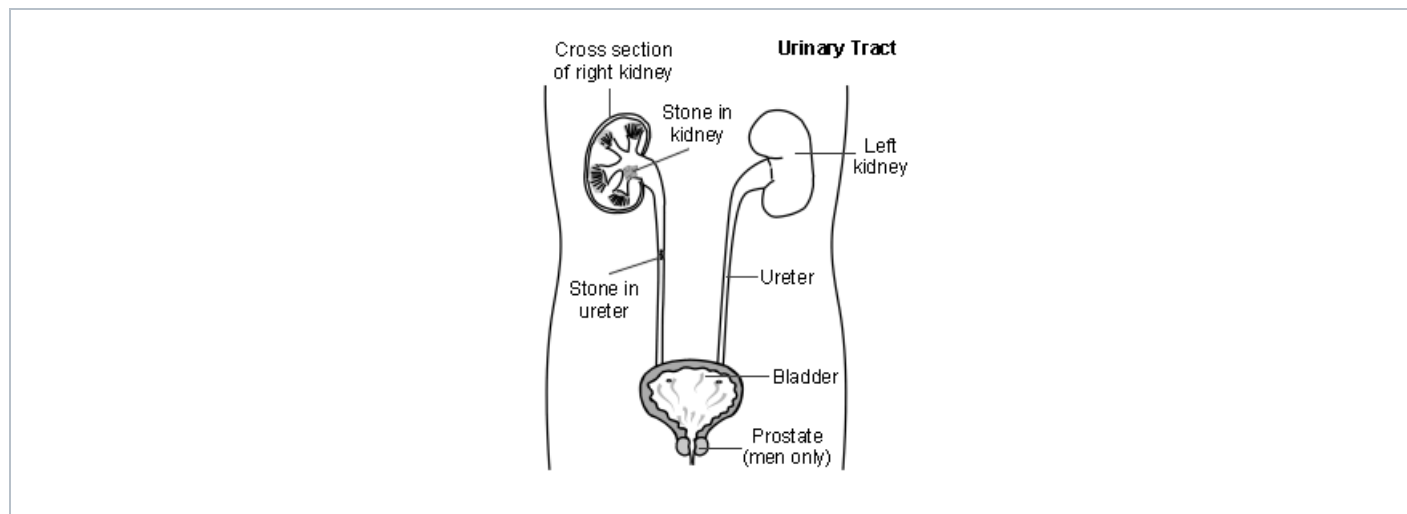
How common are kidney stones?

Each year 1 or 2 people in every 1,000 will have symptoms caused by kidney stones. About 1 in 8 men and 1 in 16 women will have an episode of pain caused by kidney stones at some time in their lives.

Kidney stones are more common in men. You are more likely to develop kidney stones if you eat a Western diet, don't drink enough fluids or you are overweight.

If you have a kidney stone there is about a 1 in 3 chance of having another stone within the following five years.

What are the causes of kidney stones?



The kidneys filter the blood and remove excess water and waste chemicals to produce urine. Urine travels from each kidney down the tube (the ureter) draining urine from the kidney into the bladder. This is called the urinary tract.

Many waste chemicals are dissolved in the urine. The chemicals sometimes form tiny crystals in the urine which clump together to form a small stone. Most kidney stones are small and pass out with the urine. Some stones become stuck in a kidney or in the ureter.

In most cases, there is no known reason why a stone is formed. Most stones are made of calcium. However, in most cases, the amount of calcium and other chemicals in the urine and blood is normal.

What makes stones more likely?

You are more likely to form a stone if your urine is concentrated. For example, if you exercise vigorously, if you live in a hot climate or if you work in a hot environment when you may lose more fluid as sweat and less as urine.

You are also more prone to develop kidney stones if you have:

- Repeated (recurrent) urine infections.
- Repeated (recurrent) kidney infections.
- An abnormal kidney - for example, with scars or cysts on it.
- A close relative who has had a kidney stone.

Underlying causes are uncommon

In a small number of cases, a medical condition causes the kidney stone. Various uncommon conditions can lead to high levels of chemicals in the body, such as calcium, oxalate, uric acid and cystine. If the level of these chemicals is high enough in the urine, they can form into stones.

Do some medicines make kidney stones more likely?

Taking certain medicines can make you more prone to making kidney stones. Examples include:

- 'Water' tablets (diuretics)
- Some chemotherapy medicines for cancer
- Some medicines used to treat HIV

However, many people safely take these medicines without developing kidney stones. If you think that a medicine you are taking is the cause of your kidney stone, you should not stop taking the medicine but discuss it with your doctor.

What are the symptoms of kidney stones?

For some people, a kidney stone may just stay in a kidney and cause no symptoms. Other kidney stones may travel out of your body in your urine without you knowing anything about it. If symptoms do occur, they include:

- **Pain from a kidney.** A stone that is stuck in a kidney may cause pain in the side of your abdomen (loin). This pain can be very severe and cause you to feel sweaty and be sick (vomit).
- **Renal colic:**
 - This is a severe pain which is caused by a stone that passes into the tube (the ureter) draining urine from the kidney.
 - The stone becomes stuck. The ureter squeezes the stone towards the bladder, which causes intense pain in the side of your tummy (abdomen).
 - The pain caused by renal colic may last from a few minutes to a few hours. The pain comes in spasms and between these spasms there may be intervals of no pain or just a dull ache.
 - The pain may spread down into the lower abdomen or groin. You may sweat, feel sick or even vomit because the pain can be very bad.
- **Blood in your urine.** You may see blood in your urine (the urine turns red). This is caused by a stone rubbing against the inside of your ureter.
- **Urine infection.** Urine infections are more common in people with kidney stones. Urine infections may cause high temperature (fever), pain on passing urine (dysuria) and a need to pass urine more often.

What tests do you need to diagnose kidney stones?

Your doctor may arrange some initial urine and blood tests:

- A **blood test** to check that the kidneys are working properly.
- You may also have other blood tests to check the level of certain chemicals that may cause kidney stones if the level is high. Examples include calcium and uric acid.
- **Urine tests** to check for infection and for certain crystals.

If you have symptoms that suggest a kidney stone, special X-rays or scans of the kidneys and the tubes (the ureters) draining urine from the kidneys may be done. These tests may start with an **X-ray** and **ultrasound scan**. A **CT scan** may also be needed. These tests are used to detect a stone, to find out exactly where it is and to check that a stone is not blocking the flow of urine.

What can be done to rule out or confirm an underlying cause?

Kidney stones are common and they are not caused by any known underlying disease for most people. However, some tests may be recommended to rule out an underlying problem. In particular, tests are more likely to be advised if:

- You have repeated (recurring) kidney stones.
- You have symptoms of an underlying condition.
- You have a family history of a particular condition.
- A stone forms in a child or young person.

You may be asked to catch a stone so that it can be analysed. This will help to find out if there may be an underlying cause for the kidney stone. To catch a stone, you will need to pass urine through gauze, a tea strainer or a filter such as a coffee filter.

What are the treatments for kidney stones?

Most stones that cause renal colic are small and pass out with the urine in a day or so. You should drink plenty of fluids to encourage a good flow of urine. **Strong painkillers** are often needed to ease the pain until you pass the stone. No other treatment is usually needed.

Some stones become stuck in a kidney or in one of the tubes (the ureters) draining urine from a kidney and cause persistent symptoms or problems. In these cases, the pain usually becomes severe and you may need to be admitted to hospital. There are various treatment options which include the following:

- **Extracorporeal shock wave lithotripsy (ESWL)** uses high-energy shock waves which are focused on to the stones from a machine outside the body to break up stones. You then pass out the tiny broken fragments when you pass urine.
- **Percutaneous nephrolithotomy (PCNL)** is used for stones not suitable for ESWL. A thin telescope-like instrument (a nephroscope) is passed through the skin and into the kidney. The stone is broken up and the fragments of stone are removed via the nephroscope. This procedure is usually done under general anaesthetic.
- **Ureteroscopy** is another treatment that may be used. In this procedure, a thin telescope is passed up into the ureter via the urethra and bladder. Once the stone is seen, a laser is used to break up the stone. This technique is suitable for most types of stone.
- **Surgery** to remove the stone. This is only needed in a very small number of cases where the above, newer techniques have not worked or are not possible. It may be done if you have a very large stone in your kidney.

Another option for a stone made purely from uric acid (about 1 in 20 stones) is to dissolve the stone. This can be done by drinking plenty of fluids and making the urine alkaline with medication.

How can kidney stones be prevented?

There are various treatment options to remove a stuck stone. About half of people who have a kidney stone develop another one at a later time in their lives. Drinking plenty of water each day may prevent this from happening again.

For the few people who have a high level of certain chemicals in the body, further advice and treatment to reduce the amount of these chemicals may be needed.

Are there any possible complications?

Complications from kidney stones are uncommon. Rarely, a large stone can completely block the urine passing down one of the tubes (ureters) draining urine from the kidney. This may lead to infection or even damage to the kidney.

This is now very uncommon because X-rays or scans will usually detect any blockage so that large stones can be removed before they cause any damage to your kidneys.

Further reading & references

- [Guidelines on Urolithiasis](#); European Association of Urology (2015)
- [CUA guideline on the evaluation and medical management of the kidney stone patient](#); Canadian Urological Association (November 2016)
- [Guidelines for acute management of first presentation of renal/ureteric lithiasis \(excluding pregnancy\)](#); British Association of Urological Surgeons (February 2012)
- [Renal or ureteric colic - acute](#); NICE CKS, April 2015 (UK access only)
- [Macneil F, Bariol S; Urinary stone disease - assessment and management. Aust Fam Physician. 2011 Oct;40\(10\):772-5.](#)

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