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Kidney Stones

The reason why most kidney stones form is not known. A stone may cause no problems but often it causes pain. Most kidney stones are small and pass out with the urine. Some stones become stuck in a kidney or in the tube draining urine from the kidney (the ureter). They can then cause persistent symptoms or problems. 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 life. Drinking plenty of water each day may prevent this from happening again (a recurrence).

What are kidney stones?

Kidney stones can form in the kidney, in the tube draining urine from the kidney (the ureter) or in the bladder. They can be many different sizes and shapes. The size of kidney stones ranges from tiny microscopic crystals to stones as large as potatoes.

How common are kidney stones?

About 3 in 20 men and 1 in 20 women in the UK develop a kidney stone at some stage in their lives. They can happen at any age but most commonly occur between the ages of 20 and 40. About half of people who develop a kidney stone will find it happens again (recurs) at least once at some stage.

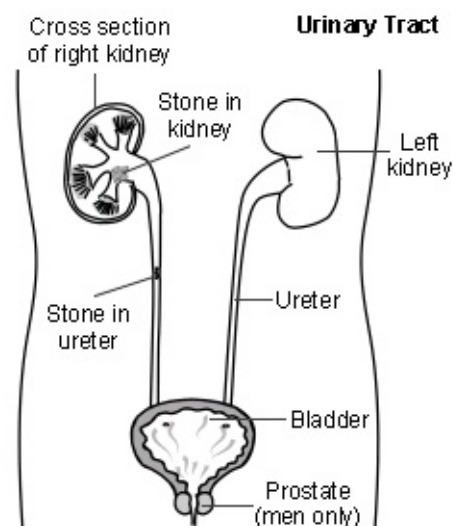
How do kidney stones form?

The kidneys filter the blood and remove excess water and waste chemicals to produce urine. Urine travels from each kidney down the tube draining urine from the kidney (the ureter) into the bladder. It then travels out of the body via the urethra when the bladder is full. 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.

What are the symptoms of kidney stones?

In some cases, a kidney stone lies in a kidney and causes no problems or symptoms. You may not be aware that a stone has formed. If symptoms do occur, they include one or more of the following:

- **Pain from a kidney.** A stone that is stuck in a kidney may cause pain in the side of the abdomen.
- **Renal colic.** This is a severe pain - which usually comes and goes but may sometimes also be constant - and is caused by a stone that passes into the tube draining urine from the kidney (the ureter). 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 may spread down into the lower abdomen or groin. You may sweat or feel sick due to the pain.
- **Blood.** You may see blood in your urine (urine turns red) caused by a stone rubbing against the inside of your ureter.
- **Infection.** Urine infections are more common in people with kidney stones. Infections can cause high temperature (fever), pain on passing urine and increased frequency of passing urine.



What causes kidney stones?

Unknown cause

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

Underlying causes are uncommon

In a small number of cases, a medical condition is the cause. 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.

Medicines

Taking certain medicines can make you more prone to making kidney stones. Examples include 'water' tablets (diuretics), some chemotherapy medicines for cancer and 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.

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

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

Are any tests needed?

Tests to confirm the presence of a kidney stone

If you have symptoms that suggest a kidney stone, special X-rays or scans of the kidneys and the tubes draining urine from the kidneys (the ureters) may be done. These tests aim to detect a stone and to check that a stone is not blocking the flow of urine.

Tests to rule out or confirm an underlying cause

Kidney stones are common and in most cases they are not caused by a known underlying disease. However, some routine tests may be recommended to rule out underlying problems. 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.

Tests which may be advised include:

- A blood test to check that the kidneys are working properly.
- Blood tests to check the level of certain chemicals such as calcium and uric acid.
- Urine tests to check for infection and for certain crystals.
- An analysis of the stone if you pass it out. To catch a stone, pass urine through gauze, a tea strainer or a filter such as a coffee filter.

If the pain eases with pain relief and you do not have symptoms to suggest complications (most people), your doctor may arrange any tests to be done as an outpatient. However, some people are admitted to hospital for strong painkillers and tests.

What are the possible complications from kidney stones?

Complications from kidney stones are uncommon (although the pain at the time can be severe). Sometimes a large stone can completely block the passage of urine down one of the tubes draining urine from the kidney (the ureter). This may lead to infection or damage to the kidney. This is usually avoided, as X-rays or scans will detect a blockage and large stones can be removed.

What is the treatment for kidney stones?

The common situations

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 that form and stick in the kidney do not cause symptoms or any harm. They can just be left if they are small.

Sometimes you may be offered medicines to help the stone pass through, such as **nifedipine** or **tamsulosin**.

In some cases

Some stones become stuck in a kidney or in one of the tubes draining urine from a kidney (the ureter) 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). This 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 nephroscope (a thin telescope-like instrument) 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 (or other form of energy) is used to break up the stone. This technique is suitable for most types of stone.
- Stone removal can be done by a traditional operation where the skin has to be cut to allow access to the ureter and kidney. 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.

What can I do to help prevent a kidney stone from developing again?

About half of people who have a kidney stone develop another one within 10 years. Sometimes stones can be prevented from forming.

Have plenty to drink

If you have had one stone, you are less likely to have one again if you drink plenty of fluid, mainly water, throughout the day (and night). The aim is to keep the urine dilute. (Your urine is more dilute if it is clear of colour rather than a dark yellow colour.) To do this, you should drink between two and three litres a day (unless your doctor advises otherwise if you have other medical problems). If you work or live in a hot environment, you should drink even more.

Other advice

For the few people who have a high level of certain chemicals in the body, further specific advice may be given. For example:

- A dietician may advise people with calcium oxalate stones to reduce the oxalate content of their diet. This may include reducing rhubarb, coffee and spinach.
- Uric acid stones can be prevented with a medicine.
- Other advice from a specialist may be appropriate for rarer conditions.

Further reading & references

- [Guidelines for acute management of first presentation of renal/ureteric lithiasis \(excluding pregnancy\)](#); British Association of Urological Surgeons (December 2008)
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