



Basic Information on Kidney and Ureteral Stones

The underlined terms are listed in the glossary.

What is a stone?

A stone is a hard, solid mass that can form in the gallbladder, bladder, and kidneys. These types of stones have different causes and are treated in different ways.

This leaflet discusses kidney and ureteral stones. These develop in the kidney and either stay there or move to the ureter (**Fig. 1**).

Kidney stones form when minerals or acid salts in your urine crystalize. Most stones leave your body while you urinate. However, in some cases you may need treatment to remove the stone.



Go Online

This information leaflet contains basic information on kidney and ureteral stones. If you want to read more in-depth information, visit our website:

<http://patients.uroweb.org/>

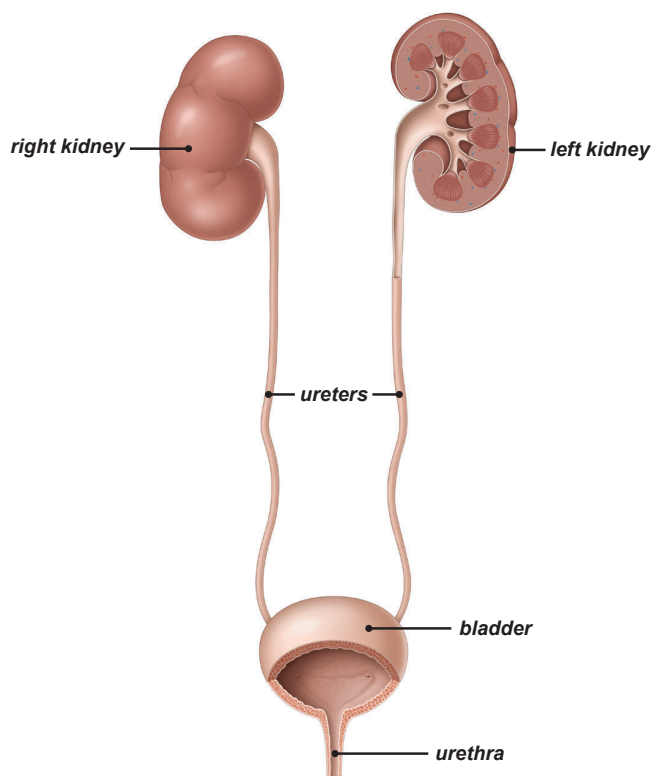


Fig. 1: The urinary tract.



Facts about kidney stones

- Stones are common: about 1 in 10 people will form a stone at some point.
- You have a 5 to 10% chance of forming a stone during your life.
- Men form stones more often than women, with a ratio of 3 to 1. This difference is now becoming smaller, perhaps due to the changes in lifestyle and diet.
- You are most likely to form a stone between the age of 30 and 50.
- Stone patients often form stones more than once in their life.

What causes kidney stones?

Anyone may develop a kidney stone during his or her lifetime. Stones can form if there is an imbalance in the way your body produces urine. This may be connected to how much you drink and whether there are substances in your urine which trigger stone formation.

Symptoms

People often associate kidney and ureteral stones with pain. However, symptoms can vary from severe pain to no pain at all, depending on stone characteristics – such as the size, shape, and location of the stone in the urinary tract.

Severe pain (renal colic)

If the stone blocks the normal urine flow through the ureter you will experience severe pain, known as renal colic. This is a sharp pain in the loin and the flank (the side of your body, from the ribs to the hip). You may feel pain in the groin or thigh too. Men can also have pain in their testicles (**Fig. 2**).

Other symptoms that may accompany renal colic are:

- Nausea
- Vomiting
- Blood in the urine (urine appears pink)
- Painful urination
- Fever

Renal colic is an emergency situation and you should contact your family doctor or nearest hospital to relieve the pain. In case of high fever you must seek medical help immediately.

Dull pain or no symptoms at all

Stones can also cause a recurrent, dull pain in the flank. This kind of pain may be a symptom of other diseases as well, so you will need to take medical tests to find out if you have kidney or ureteral stones.

Some stones do not cause any discomfort. These are called asymptomatic stones and are usually small. In general asymptomatic stones are found during x-ray or similar imaging procedures for other conditions.

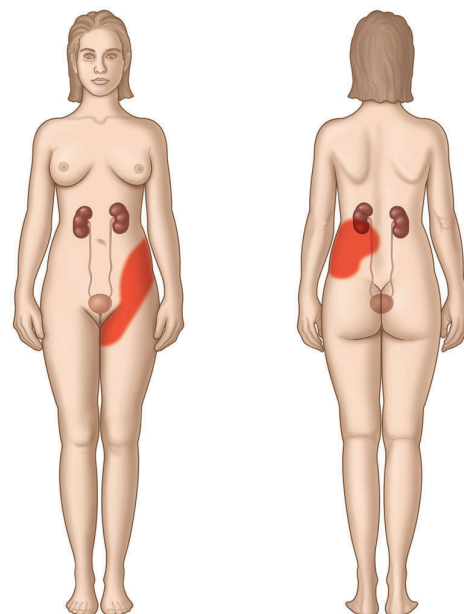


Fig. 2: Area of possible renal colic pain.

Diagnosis

The doctor does a series of tests to understand what causes your symptoms. This is called a diagnosis. First, the doctor or nurse will take your medical history and do a physical examination. Then, they will take images of your body and perform other tests if needed.

Imaging techniques

To locate your stone the doctor needs to take images of your internal organs. You will get an ultrasonography (also known as ultrasound), which uses high-frequency sounds to create an image. In addition to ultrasonography, you may need an x-ray of the urinary tract.

Another common method of diagnosis is a CT-scan (computed tomography). This scan can clearly show the size, shape, and thickness of the stone.

Stone analysis and other tests

In case of renal colic, your urine and blood is tested to see if you have an infection or kidney failure.

If your stone is expected to pass with urine, your doctor may recommend that you filter your own urine to collect the stone. The doctor will analyse it in order to understand what type of stone you have. This information is important because it helps to select the best options for treatment and prevention.

Treatment

Not all stones require treatment. You need treatment if your stone causes discomfort and does not pass naturally with urine. Your doctor may also advise treatment if you have pre-existing medical conditions.

If you have a kidney or ureteral stone which does not cause discomfort, you will generally not receive treatment. Your doctor will give you a time schedule for regular control visits to make sure your condition does not get worse.

If your stone is likely to pass with urine, your doctor can prescribe drugs to ease this process. This is called conservative treatment.

Conservative stone treatment

Most kidney or ureteral stones will leave your body while you urinate. However, depending on the size and location of the stone, it will take you some time to pass the stone. You may suffer from renal colic when the stone moves.

In general you can keep this in mind:

- The closer the stone is to the bladder, the higher the chance of passing it
- The bigger the stone, the smaller the chance of passing it

Medical Expulsive Therapy

Your doctor may prescribe drugs (so called alpha-blockers or nifedipine) to help you pass the stone faster and to limit pain while it moves. This is called Medical Expulsive Therapy (MET) and it is most effective for ureteral stones.

During MET you should see your doctor regularly – how often depends on his or her recommendation. The doctor needs to check if the stone keeps moving and if your kidneys continue to function well.

Active stone treatment

Kidney or ureteral stones should be treated if they cause symptoms. There are three common ways to remove stones: shock-wave lithotripsy (SWL), ureteroscopy (URS), and percutaneous nephrolithotomy (PNL). Which active treatment option is best for you depends on many aspects. The most important factor is the symptoms the stone causes. Based on whether the stone is in your kidney or your ureter, the doctor may recommend different treatment options.

Shock-wave lithotripsy (SWL)

SWL is done with a machine that can break stones from outside the body. To break the stone, focused shock waves (short pulses of high energy sound waves) are transmitted to the stone through the skin. The stone absorbs the energy of the shock waves and this breaks it into smaller pieces. The stone fragments then pass with urine in the days or weeks after the procedure (**Fig. 3**).

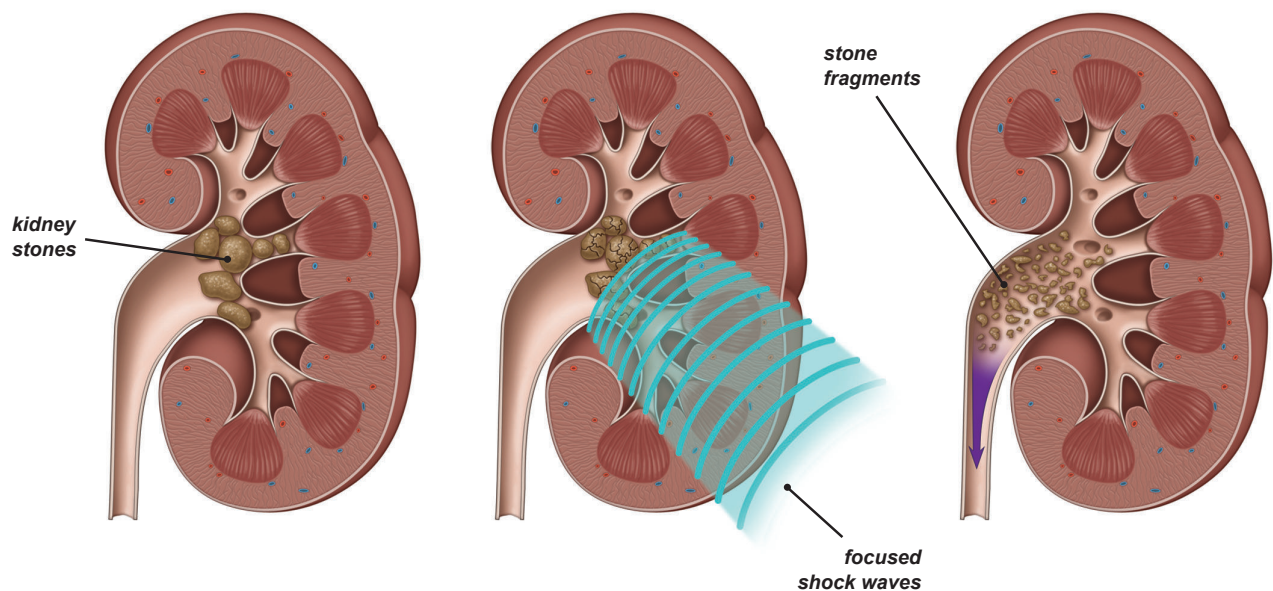


Fig. 3: Focused shock waves break the stones into fragments.



Interesting Fact

SWL was first used to treat stones in 1980 and within a few years it became the standard treatment option.



Go Online

Watch how SWL is performed in this YouTube video by BUPA:
<http://youtu.be/ODL3eEZY8M>

Ureteroscopy (URS)

URS is a type of treatment which is done with a small-calibre endoscope. URS is common, success rates are very high, and the risk of complications is low.

For URS you will receive general or local anaesthesia. Once you are under anaesthesia, the doctor enters your bladder with the endoscope through the urethra without making an incision in your body. The stone is pulled out using a special “basket” (Fig. 4).

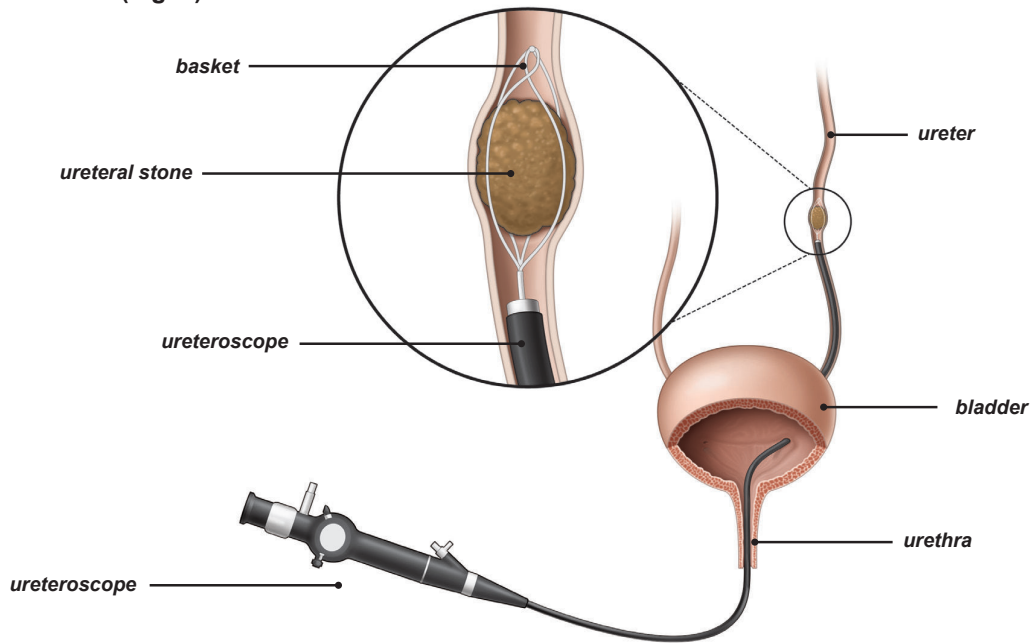


Fig. 4: A stone is pulled out of the ureter using a basket.

Percutaneous Nephrolithotomy (PNL)

PNL is a surgery to remove large stones directly from the kidney. The advantage is that even very large stones are removed in a single operation (Fig. 5a and b). PNL is carried out under general anaesthesia.

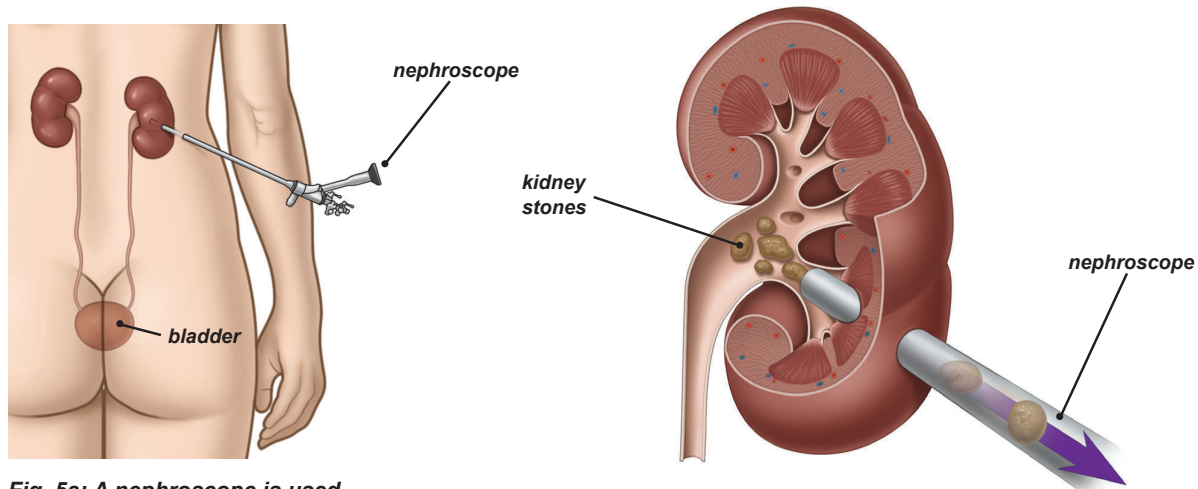


Fig. 5a: A nephroscope is used to remove stones directly from the kidney.

Fig. 5b: Stone fragments are removed in a single procedure with a nephroscope.

Prevention of stone recurrence

Some patients who have had kidney or ureteral stones may form more stones in the future. After your stone passes or is removed, your doctor will determine if you are at high risk of recurrence. To do so, he or she will need to analyse the stone. In addition, the doctor will consult the results of your blood and urine tests which were done before treatment.

If your risk of recurrence is low, general lifestyle changes will be enough to cut the risk of forming another stone. The following advice is for adults.

Drink more

- Make sure you drink 2.5 to 3 litres every day
- Drink evenly throughout the day
- Choose pH-neutral drinks such as water or milk
- Monitor how much you urinate. It should be 2 to 2.5 litres every day
- Monitor the colour of your urine: it should be light
- Drink even more if you live in a hot climate or do a lot of physical exercise. This will help you to balance your fluid loss

Adapt your diet

Depending on your individual situation, your doctor may recommend that you adapt your diet. It is important to discuss this with the doctor first.

- Have a balanced and varied diet
- Eat lots of vegetables, fibres, and fruits (especially citrus fruits)
- Try to eat more low-oxalate foods like eggs, lentils, white rice, peeled apples, grapes, cauliflower, squash, etc.

- Make sure your diet contains a sufficient amount of calcium (about 1,000 milligrams a day). However be careful with calcium supplements and always ask your doctor or nurse for advice
- Reduce the amount of salt in your diet (no more than 3 to 5 grams a day)
- Do not eat too much animal protein, especially meat from young animals. Instead, eat more vegetable protein, found for example in avocados, cauliflower, or peas
- Maintain a healthy weight (your Body Mass Index should be between 18-25 kg/m²)

Healthy habits

Adopting a healthy lifestyle is always a good idea.

- Try to exercise 2 or 3 times a week
- Avoid stress

Metabolic Evaluation

If you have a high risk of forming more stones, your doctor will do a metabolic evaluation. This is a series of blood and urine tests to determine which additional treatment you may need.

Depending on the test results, you may get medication. Generally, the medication will cause little or no side effects. In addition, it may be helpful to consider lifestyle changes. Your doctor will discuss your individual situation and treatment options with you.

Glossary

Anaesthesia (general or local)	Before a procedure you will get medication to make sure that you don't feel pain. Under general anaesthesia you are unconscious and unaware of what is happening to you. Under local anaesthesia you will not feel pain in the part of your body where the procedure is done. Anaesthesia wears off gradually after the procedure.
Bladder	Organ that collects urine from the kidneys (see also Kidneys).
Computed tomography (CT)	Imaging technique that makes a series of x-ray images of your body.
Endoscope	A tube-like instrument to examine the inside of the body. Can be flexible or rigid.
Kidneys	Two bean-shaped organs in the back of the abdomen that filter the blood and produce urine.
Medical Expulsive Therapy (MET)	Medication that makes the natural passing of stones easier and less painful.
Oxalate	A component found in many kinds of food which may be related to forming kidney or ureteral stones.
Renal colic	Severe pain in flank, loin, groin, or thigh caused by a stone blocking the normal flow of urine.
Ultrasonography	Imaging technique that uses high-frequency sounds to make an image of the inside of the body.
Ultrasound	see Ultrasonography.
Ureter	One of the two tubes through which urine flows from the kidneys to the bladder.
Urethra	The tube that carries urine from the bladder and out of the body.
Urinary tract	The organ system that produces and transports urine through and out of the body. It includes two kidneys, two ureters, the bladder and the urethra. The urinary tract is similar in men and women, only men have a longer urethra.
Urolithiasis	Stone disease.
Urologist	A doctor specialized in health and diseases of the urinary tract and the genitals.

This information was last updated in June 2012.

This leaflet contains general information about kidney and ureteral stones. If you have any specific questions about your individual medical situation you should consult your doctor or other professional healthcare provider.

This information was produced by the European Association of Urology (EAU) in collaboration with the EAU Section of Urolithiasis (EULIS), the Urolithiasis Section of the EAU Young Academic Urologists Group, and the European Association of Urology Nurses (EAUN).

The content of this leaflet is in line with the EAU Guidelines.

Contributors:

Dr. Thorsten Bach	Hamburg, Germany
Dr. Murat Binbay	Istanbul, Turkey
Ms. Nicola Dickens	London, United Kingdom
Ms. Bente Thoft Jensen	Århus, Denmark
Prof. Dr. Thomas Knoll	Sindelfingen, Germany
Mr. André Mendes	Castelo Branco, Portugal
Dr. Francesco Sanguedolce	Barcelona, Spain
Dr. Christian Türk	Vienna, Austria