









Inside this Guide

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General information

You may have been diagnosed with a kidney stone... This guide shall help you understand how this diagnosis affects you and what solutions are available to you.

This document acts as a guide and cannot replace the role and relationship you have with your physician. It is essential you seek professional clinical opinion from your physician.

What is a urinary calculus?

It is a stone, mass of different crystals, that forms in the urinary system.



What is the urinary system?

It is all the organs that ensure the production and elimination of urine. It consists of two kidneys (production site), two ureters (tubes from kidney to bladder), a bladder (storage site) and a urethra (tube to urinate).

Who can get urinary stone disease?

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Urinary stone affects about 12% of the world population and occurs more frequently in men than in women within the age of 20-49 years.¹ An increase in new cases (incidence) has been noted in the past decades in both developed and developing countries.¹

Why do calculi form?²

The main reasons are diet excesses (excess calcium, sugar, salt, animal protein, etc.) and insufficient fluid intake.

What are the symptoms associated with these stones?¹

When they migrate into the urinary tract, the stones may lead to the appearance of blood in the urine (hematuria), pain in the lower back (renal colic), or urinary infections.

What is an attack of renal colic?^{3,4}

Classically, the following are signs of renal colic:

- Sudden onset;
- Sharp pain in the lower back (lumbar pain), on the right or left side;
- Pain that may spread down to the testicles in men and the labia majora (vulva) in women;
- There may be vomiting/nausea;
- Often the patient is agitated due the intense pain and cannot find a position in which to feel more comfortable;
- Sometimes there may be signs of irritation in the bladder (frequent desire to urinate): this generally means that the stone is at the end of the ureter at the entrance to the bladder.

Why does an attack of renal colic occur?³

The stones form an obstacle to the smooth flow of urine, which accumulates above the obstacle and leads to distension of the cavities in the kidney. This overpressure then causes the attack of renal colic.

General information

What additional examinations are required?³ In order to find the cause of the renal colic, your doctor may ask you to undergo various examinations:

- X-ray of the abdomen (KUB) and ultrasound of the kidneys and bladder
- Scan of the abdomen and pelvis with or without contrast injection
- Blood sample analysis
- An analysis of your urine to check for any infection or the presence of blood



Treatment option^{3,5,6}

How is renal colic treated?

The first and most important step, is to address the pain. In an emergency, the treatment is aimed at giving you rapid relief. The most effective medications are non-steroidal anti-inflammatory agents^{3,4}. If these are not sufficient, more powerful painkillers derived from morphine may be used. Admission to hospital is not always necessary. The stone itself is not treated in emergency.

When is admission to hospital necessary?³

- In the event of fever (temperature > 38° C or 100.4°F) associated with urinary infection.
- In the event of persistent pain in spite of painkillers.
- If the urine is unable to exit the body it is called anuria and it is related to the absence of urine in the bladder.

How are calculi treated?

- Small stones may be eliminated spontaneously by natural means. It is useful to collect them to analyse their composition. To do this, urinate into a coffee filter or tea strainer, keep the stone(s) dry in a container and follow the instructions of your doctor. But above all, don't throw the stone(s) away! Indeed, different kinds of stones exist and the diet recommendations will be defined up to the nature of the stone analysed.
- If the stone is not eliminated within a reasonable length of time (a few weeks) or is still painful, your urologist may suggest you undergo surgery, the method of which will depend on the size, location and nature of the stone. In all cases, remote-controlled imaging must be performed to confirm the healing.

Different kinds of surgeries available⁶

• Extracorporeal lithotripsy: a machine is used that creates shock waves that are directed on to the stone to break it. The fragments will then be eliminated during urination.

• Ureteroscopy: the surgeon uses a device with a camera that is passed through the urinary natural tract to remove or destroy the stone, usually with a laser.

• Percutaneous nephrolithotomy (or PCNL) : surgical access through the back directly into the kidney (1cm incision).

• Open surgery via laparoscopy by incision: have become exceptional.

The indications are associated with very large stones stuck in the urinary tract when above techniques are not feasible.

Percutaneous access



Treatment option

What is ureteroscopy?⁶

This technique makes it possible to reach the stone through the urinary natural tract. This is done by entering a small tube fitted with a camera, called an ureteroscope, into your urethra up to the ureter and renal cavities. Your doctor will then be able to either remove an entire stone (in 1 piece) or to fragment it using various means.

Hospitalisation can last a single day in an outpatient setting to several days. This depends on the stones, anatomical difficulties and the condition of the patient. Ureteroscopy is most often carried out under a general anaesthetic.

At the end of the procedure it may be decided that a small tube (a single J or double J stent) is left inside your ureter for few days.

What is percutaneous nephrolithotomy?

This technique consists of puncturing the kidney through the back under general anaesthetic in order to create a direct tract into the kidney. According to the indication, patients may lie flat on their stomach or on their back, so that a camera with an instrument (this is called a nephroscope) can be positioned through the tract, enabling the stones to be visualised, fragmented and extracted. At the end of the procedure a drain is often left in place through the skin (nephrostomy).

Hospitalisation for this type of procedure lasts 2 to 5 days on average. $^{7,\,8}$









JJ stent placement

At the end of the procedure it may be decided that a small tube (a single J or double J stent) is left inside your ureter.

What is a double J (or JJ)?

A JJ stent is a small tube placed inside your urinary tract without incision (natural way). The surgeon will check if it is well in place thanks to a radiology system after the procedure. Inserted into the ureter, the stent goes from the kidney to the bladder. Both tips of the stent are curved, hence its name of double J or JJ. It doesn't stick out from the body, it is internal and so invisible. In some cases, a string may remain visible out of your urethra, which will help the surgeon to remove the stent after a few days.

JJ ureteral stents are composed from a variety of different materials with various rigidities to meet the needs of the physician and the patient. As a foreign body in your ureter, the stent may be associated with some discomfort. Some firm materials can generate more discomfort to the patients.

Hydrocoated silicone stents have demonstrated their capacities to reduce urinary symptoms, patient discomfort, and mineral deposit along the stent (encrustation).⁹

Short, medium and long-term stents of different lengths and diameters are available.^{10, 11}

The purpose of the stent is to help the urine flow towards the bladder and prevent any renal colic. Therefore, the JJ stent dilates the ureter, allows smooth evacuation of stones residues and avoids blockage within the ureter. It also allows healing of the mucosa after the procedure.

As the presence of this stent enables the urine to flow upwards into the kidney during urination, this may cause a painful sensation at first. The kidney generally becomes accustomed to it in a few days. After setting up the stent, it is recommended to drink abundantly¹², to urinate regularly and not to force when urinate.



JJ stent placement

Regular side effects of your stent¹³

• Pain, discomfort due to pressure that may increase when moving or after passing urine

- Bladder irritation symptoms include:
 - Frequency
 - Urgency
 - Dysuria: painful or difficult urination
 - Leakage
 - Feeling of being unable to completely empty your bladder
- Hematuria: having blood in your urine

Don't forget! You have a foreign body in you that will have to be removed in the weeks following its insertion.

Very rare stent complications^{14, 15}

- Migration or dislodgement of the stent
- Encrustation of the stent: the formation of a thin coating of stone material on the stent
- Obstruction of the stent
- Rupture of the stent
- Erosion of the mucosa
- Increased risk of a Urinary Tract Infection (UTI)

JJ stent placement

How long will my stent stay in?^{12, 16}

JJ Stent are intended to be placed in the body temporarily. During the treatment process of urinary stones, the JJ stents are left in place from a few days to a few weeks, depending on the case, after which they must be removed. The JJ stent will be removed remotely, through the urinary tract, usually under local anaesthetic at a consultation (few minutes intervention) or sometimes under general anaesthetic.





Work:

If your job requires a significant amount of physical movement you may experience some pain and discomfort in your stomach and back area.

Diet:



Nutritional guidelines could be proposed up to the nature of the stone. Your diet can remain the same, but ensure that you are drinking plenty of fluids (2 liters per day) after the procedure. If you are taking any medications, ask your doctor if it is okay to consume alcoholic beverages.



Sex:

No specific contra-indications but some discomfort may occur during sexual activity. If your stent has a string, you may experience more discomfort and the stent may become dislodged.



Social Life:

Your social life should not be disrupted, but you may notice an increased frequency and urgency to use the restroom.



Exercise:

Activity may cause pain and discomfort in your stomach area. Avoid vigorous exercise if there is excess blood in your urine.



Travel:

Before traveling, consult your doctor regarding your condition to see if it is safe. Your stent should not affect your ability to travel. Quality of life with a JJ stent

How will my stent be removed?

Your stent will be removed one of two ways:

If your stent has a string, your doctor will gently remove the stent by pulling on the string.¹⁷

If there is no string, the doctor will use an instrument called a cystoscope to grasp the stent coil located in your bladder and gently pull it through the urethra.

You may experience some discomfort during the removal procedure and potentially experience slight pain few days after the stent has been removed.^{18, 19}

Isiris is an innovative single use stent removal solution with an integrated grasper, offering complete flexibility anywhere, anytime.^{20, 21}

Isiris demonstrated reduction in delays of stent removal and consequently significant quality of life improvements for patients²².



Metabolic assessment

Why does my surgeon talk about a "metabolic assessment"?

The formation of urinary calculi is a condition that can develop over time and recur.

Bad alimentary habits represent a major cause of the stones creation. Some dietetic measures related to drinks and diet can be taken to limit the recurrence.²³

Following successful treatment of urinary stones, it is important to identify and manage the risk factors associated in the cause of urinary stone formation. This is called "metabolic assessment".

The risk of recurrence is high.

If patients do not apply prevention measures, the relapse rate of secondary stone formations is estimated to be 10–23% per year, **50% in 5–10 years, and 75% in 20 years** after the first event in the patient.¹



Based on dietary habits, underlying diseases, analysis of the removed stones and blood/ urinary tests, the urologist will be able to identify the causes of his patient's urinary stone disease and put corrective measures into place. A medical drug can be prescribed but, in most cases, the treatment will be limited to diet recommendations. Dietary guidelines will be established by the doctor who can hand out a personalised explanatory sheet.

Sometimes it will be necessary to add to these first line exploratory examinations with more thorough exploration in a specialised environment.

Finally, urinary stone patients must perform regular check-ups of their kidneys and urinary tract, even in the absence of pain, e.g. by having an ultrasound examination every year, in case of any possible recurrence.

What does the "metabolic assessment" consist of?

• Analysing the stone

This is carried out on the entire stone or fragments collected by the patient or urologist. The fragments must be stored in a container in a dry place and will be analysed using "Infrared Spectrophotometry". If no stone or fragment has been recovered, a study will be performed of the nature of the urine crystals by examining the fresh urine, known as "Crystalluria".

Dietary survey

This provides information about a urinary stone patient's eating and drinking habits. The urologist or dietary specialist will enquire in particular about the quantity and nature of the drinks, but also about the number and nature of dairy products, the daily amount of animal protein (meat, fish and seafood, eggs, processed pork products), the amount of salt and consumption of certain foods that are especially high in oxalate (dark chocolate and cocoa, tea, walnuts and hazelnuts, spinach, jelly candies, etc.).

• A fasting blood sample and a collection of urine over 24 hours These biological examinations can be carried out in any analytical laboratory. Dietary guidelines^{2, 24}

Drinks

It is important to drink water in sufficient quantities. This dilutes your urine and reduces the risk of stones. If you are drinking enough water, you shall expect to produce approximately **2 Liters** of clear or light yellow colored urine per day.

How much should you drink?

• 2 litres per day, or more if it is a warm day or you undertake a sports activity.

When should you drink?

- Every day, taking a drink regularly throughout the day.
- Including at night before going to bed.
- And during the night if you wake up.



What should you drink?

- All liquids are allowed: tap or bottled water, coffee, herbal tea, etc.
- The quantity of fluid intake is more important than the quality.
- Two glasses of freshly squeezed orange juice is recommended.

Bad dietary habits are a major cause of calcium, oxalate and uric stones. Dietary management involves both drinks and food.

Food

It is not a question of going on a diet but of adjusting your dietary habits.

Too much calcium, salt, sugar, animal protein, oxalate and uric acid can increase the risk of stones.

Calcium intake

• Calcium comes from water and dairy products.

• Do not avoid milk, yogurt, fresh cheeses but you should aim for a balance - neither too much nor too little calcium.

• Your intake should be anything from 800mg to 1 gram per day.

• It is recommended that you have 2 to 3 portions of dairy products per day depending on the calcium content of your water (see table).

• 1 glass of milk (15cl) = 1 yoghurt = 100g of cream cheese.

In real terms, calculate and then choose accordingly

• If you drink 2 litres of water that is low in calcium (less than 20mg/l), you should consume around 800mg of calcium in the form of dairy products.

• If you drink 2 litres of water that is high in calcium (more than 400mg/l), you should limit your dairy intake.

Salt intake

• Too much salt in your food will increase natriuresis (the amount of salt in your urine) which can increase the amount of calcium excreted in your urine.

• You should limit your intake of foods and meals that are too salty (cured meats, fast food, ready meals).

• Limit salt intake to 6 g/day.

• Never add salt at mealtimes.

Uric acid intake

• You may be prescribed to limit your intake of foods that contain uric acid: sugar (main source of uric acid), cured meats, of al (sweetbreads, kidneys, brain,liver, etc.), certain types of fish (herring, tuna, troutsardines in oil, anchovies, etc.) and seafood.

• Eat fruit and vegetables regularly.

Animal protein intake

• Animal protein is found in meat, fish, cured meats, poultry and also in eggs and seafood. 100g of meat corresponds to 100g of fish.

• Limit animal protein intake and prefer proteins from vegetable sources.

Oxalate intake

• Foods that are high in oxalate should be eaten in moderation, particularly chocolate and cocoa.

• Also peanuts, walnuts, hazelnuts, almonds, asparagus, beetroot, rhubarb, spinach, sorrel, tea, figs.

• Vitamin C in large quantities (500mg to 1g tablets) is not advised.



Patient's notes

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ImaJin[™] Double Loop Stent Kit Important Safety Information Indications:

- Drainage of the upper urinary tract over fistulas or ureteral obstacles. (e.g: periureteral tumour)
- Cicatrisation stent

Contraindication: This device is not indicated for patients with a progressive infection of the upper urinary tract.

The device may not be suitable for patients who are allergic or hypersensitive to silicone, as the manufacturing process may leave traces of silicone on the device. Healthcare professionals should assess the patient's allergy history.

Precautions: The choice of the characteristics of the stent kit is under the responsibility of the physician. Any use other than stated indications is under the responsibility of the physician. These kits must only be used by trained and experienced professionals.

Warning: The Imajin Stent Kit is only intended for single use. Reuse, reprocessing or resterilization may compromise the physical integrity of the device or create a risk of harm to the patient.

Adverse Events: The following events have been reported although their occurrence greatly depends on patients' medical conditions: infection, encrustation, obstruction, rupture, migration, bladder irritation symptoms, pain, hematuria, erosion.

Some events may be related to this procedure, amongst which those related to the guidewire: ureteral perforation, or burns when in contact with an electrosurgical equipment.

You can play an active role in your health care by talking to your doctor or nurse specialist.



Ostomy Care / Continence Care / Wound & Skin Care / Interventional Urology

Coloplast develops products and services that make life easier for people with very personal and private medical conditions. Working closely with the people who use our products, we create solutions that are sensitive to their special needs. We call this initinate healthcare. Our business includes Ostomy Care, Continence Care, Wound and Skin Care and Interventional Urology. We operate globally and employ about 12,000 employees.