Endoscopic removal of kidney stones

This information sheet explains the procedure to remove one or more kidney stones using an endoscope (a tube containing a small camera, a light and a device to break up the stone). The procedure is also called percutaneous nephrolithotomy (PCNL). This information sheet explains what the procedure involves, why it might be suggested and what to expect when your child comes to Great Ormond Street Hospital (GOSH) for treatment.

What is endoscopic removal of kidney stones?

This is a procedure to remove one or more kidney stones using an endoscope (a tube containing a small camera, a light and a device to break up the stone). The procedure is carried out by a urologist (doctor specialising in the urinary system) and a radiologist (doctor specialising in imaging techniques). The procedure usually takes two to three hours.

Kidney (or renal) stones are clusters of tiny crystals that can form in the kidneys. Most clusters are too small to cause any problems and pass out of the body in the urine. Sometimes, the clusters can clump together to form bigger clusters, which may eventually become big enough to block the urine collecting system in the kidney. Sometimes, they pass out of the kidney down the ureter and out in the urine without causing any problems, but if they are big they may block the ureter or lodge in the bladder. For more information about kidney stones and what causes them, please see our Kidney stones information sheet.

Some kidney stones do not cause any symptoms at all, particularly if they are very small and not causing a blockage. However, kidney stones can be painful and cause blood in the urine (haematuria) and generally feelings of being unwell, such as a high temperature and vomiting. If the stone passes out of the kidney into the ureter, it can cause severe pain.
Kidney stones can cause an infection. Signs of an infection include a high temperature, vomiting and/or diarrhoea and urine that is pink or cloudy. Studies have shown that pain is not experienced in approximately half of young children with stones. If left untreated, stones can damage the kidneys.

**What happens before the procedure?**

You will receive information about how to prepare your child for the procedure in your admission letter. You will need to come to GOSH before the procedure so that your child can have a pre-admission assessment to check that they are well enough. This appointment will involve taking blood and urine samples and other tests. The doctors will usually carry out an ultrasound scan and x-ray to confirm the position of the stone(s) within the kidney shortly before the procedure.

The doctor will explain the procedure in more detail, discuss any questions you may have and ask you to sign a consent form giving permission for your child to have the procedure. If your child has any medical problems, please tell the doctors.

Many of the studies we perform involve the use of x-rays. Legally, we are obliged to ask any girls over the age of 12 whether there is any chance they might be pregnant. This is to protect babies in the womb from receiving unnecessary radiation.

**What does the procedure involve?**

Endoscopic removal of kidney stones is always carried out while your child is under a general anaesthetic, because they need to lie very still throughout the procedure and it can take a while. It is important that your child does not eat or drink anything for a few hours before the anaesthetic. This is called ‘fasting’ or ‘nil by mouth’. Fasting reduces the risk of stomach contents entering the lungs during and after the procedure.

You will be informed the night before the procedure of the time that your child should be ‘nil by mouth’ – in other words, have nothing to eat or drink before the anaesthetic. Fasting times are provided in your admissions letter – in broad terms, this is six hours for food (including milk), four hours for breast feeding and two hours for clear fluids before the procedure.

It is equally important to keep giving your child food and drink until those times to ensure they remain well-hydrated and get adequate nutrition. This may involve waking your child in the night to give them a drink which we recommend.

Once your child is under general anaesthetic, the doctors will insert the endoscope into your child’s urethra. From here, they will pass it into your child’s bladder. Using the endoscope, they will insert a soft plastic tube into your child’s ureter towards the kidney. A second small plastic tube is placed alongside this tube into the bladder (catheter). The tube in the ureter is removed at the end of the procedure, while the bladder catheter will be removed on the ward a day or two after the operation.
Your child will be rolled over onto their tummy and an ultrasound scan will be used to identify the kidney and the best way to reach the stone(s) inside it. Once this has been confirmed, the doctors will inject local anaesthetic into the skin and underlying tissues of your child's back or side, make a small cut and insert a needle into the kidney. A soft guide wire is threaded through the needle, which is then removed. The position of the guide wire is checked using an x-ray. The tract through the skin, muscle and fat to the kidney (around the guide wire) can then be stretched until it is wide enough to take the tube containing the camera (endoscope). Once the doctors can see the stones on the camera, they can remove them using the endoscope if they are small enough. Larger stones can be broken up using an ultrasound or laser device inside the endoscope. If there is more than one kidney stone, the doctor may need to create further tracts through the skin to reach the stones.

Once the doctors have removed as many of the kidney stones as possible, they will leave a nephrostomy through the tract created during the procedure. This is a thin, plastic tube that comes out through the skin to drain urine from a kidney. This is stitched in place and a dressing put over the top. Urine and any small bits of kidney stone drain from the kidney through the tube into a bag which needs be emptied regularly on the ward. Most children have some blood in the urine and fluid leak alongside the nephrostomy for the first few days after the procedure. The stones removed from the kidney are sent to the laboratory to help understand why they have formed.

Are there any risks?
Endoscopic removal of kidney stones is carried out under general anaesthetic, and although every anaesthetic carries a risk, this is extremely small. The procedure can be quite painful so your child will be given pain relief during the procedure and will often have a nurse-or-patient controlled pump delivering small quantities of painkiller through a drip for a day or so afterwards. Further information about pain relief is available in a separate information sheet.
As many stones contain bacteria, there is a risk of infection. Your child will receive a course of antibiotics. There is a chance that your child could bleed from the place where the nephrostomy tube was inserted, but this is very unusual. It is very common for children to develop a bruise in the area but this will fade in a few days.
Sometimes, urine can leak out of the kidney and collect in the abdomen instead of passing into the nephrostomy tube. If the amount of leakage is small, this should not cause too many problems, but your child may need a separate drainage tube from the abdomen if the amount increases.

There is a chance that the kidney will bleed during the procedure or soon afterwards. Again, if the amount of blood is small, this should not cause too many problems, but another operation is occasionally needed to deal with it if the amount increases.

Occasionally, the doctors will not be able to remove all of the kidney stones during one procedure. Depending on the size and location of the stones, they may suggest a second procedure at a later date. Alternatively, they may suggest monitoring the stones and their effects.

**Are there any alternatives to endoscopic removal of kidney stones?**

An alternative procedure is called ‘extracorporeal shock wave lithotripsy’ (ESWL). This uses sound waves delivered through the skin to break up the stone(s). This may not be suitable for your child as the sound waves do not work well on some types of kidney stone.

Kidney stones can also be removed in an open operation on the kidney, but this has a greater risk of bleeding and infection than endoscopic removal. It will also leave a larger scar on your child's abdomen. Occasionally endoscopic removal is not suitable, in which case the doctors will suggest open surgery.

**What happens afterwards?**

Your child will return to the ward after they have recovered from the anaesthetic. Some children feel sick and vomit after a general anaesthetic. Your child may have a headache or sore throat or feel dizzy, but these side effects are usually short-lived and not severe. Your child can start eating and drinking as normal once they feel like it.

The doctors will come to check your child's progress on the ward and will give you some information about what they have done during the procedure.

Your child will continue to have regular pain relief, either through a vein or by mouth. The nurses will check the nephrostomy regularly to make sure it is working well and will empty the drainage bag as needed. It is common for the urine draining from the kidney to look a red and then pink colour for the first few days. They will also check your child's vital signs, including pulse, breathing and blood pressure regularly.

After a couple of days or so, your child's nephrostomy will be clamped and then removed. The bladder catheter will also be removed at this time.
**Going home**

Most children feel ready to go home within three to five days. There will be a small dressing over the nephrostomy site, which you should remove after 48 hours. We advise that your child avoids games or PE for at least five days after the procedure.

Your child will be seen in the outpatient clinic a few months later with the results of the stone analysis and repeat imaging tests, including an ultrasound scan. Further tests, mostly on urine, will be undertaken to understand the risk of your child developing further stones and what treatment may be needed to prevent this.

**You should call the hospital if:**

- Your child starts bleeding from the nephrostomy site. If bleeding happens, apply pressure to the area immediately.
- Your child is in a lot of pain and pain relief does not seem to help.
- Your child develops a high temperature or other signs of infection.
- The area where the nephrostomy was inserted looks red, swollen and feels hotter than the surrounding skin.
- There is a lot of blood in your child’s urine – a small amount making the urine look pink is normal.
- Your child is not drinking any fluids after the first day back at home.

---

**Notes**

---

Compiled by the Interventional Radiology team in collaboration with the Child and Family Information Group

Great Ormond Street Hospital for Children NHS Foundation Trust
Great Ormond Street,
London WC1N 3JH

www.gosh.nhs.uk