

# Percutaneous Nephrolithotomy (PCNL)

Keyhole surgery for kidney stones



**Information for patients**

Urology



**PROUD TO MAKE A DIFFERENCE**

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This leaflet contains evidence-based information about your proposed urological procedure. It is based on the national BAUS (British Association of Urological Surgeons) information sheet which was developed after consultation with specialist surgeons and so represents best practice in UK urology. You should use it in addition to any advice already given to you.

To view the online BAUS version of this leaflet, type the text below into your web browser:

[www.baus.org.uk/\\_userfiles/pages/files/Patients/Leaflets/PCNL.pdf](http://www.baus.org.uk/_userfiles/pages/files/Patients/Leaflets/PCNL.pdf)

Further general information about kidney stones can be found on the Patients' section of the BAUS website under "I think I might have ... kidney stones"

## **Key points**

- The aim of this procedure is to break up stones in the kidney using a "keyhole" approach to your kidney through a puncture in the skin of your back.
- It is a major procedure and is usually reserved for larger stones or for patients with complex kidney anatomy.
- We puncture the kidney with a needle, under ultrasound and/or X-ray guidance, and stretch up a "track" into the kidney through which we can pass a telescope.
- The stone is broken up using an ultrasonic suction probe, a laser fibre or a small pneumatic drill (lithoclast).
- This procedure has largely eliminated the need for open surgery to remove kidney stones, because it has a similar success rate and recovery is much faster.

## What does this procedure involve?

This involves puncturing your kidney through the skin of your back with a needle (using X-ray and/or ultrasound to guide the puncture) and stretching up a track into the kidney through which we can pass a telescope. We may need to puncture the kidney at more than one site to reach all your stone(s). We then break up the stone(s) in your kidney using an ultrasound probe and/or pneumatic lithoclast (mechanical fragmenter) or a laser. We often leave a drainage tube in your kidney (nephrostomy) at the end of the procedure and we may leave a catheter in your bladder.

## What are the alternatives?

- **Observation** - stones smaller than 5mm in diameter can pass by themselves but sometimes get stuck within the kidney. Larger stones (greater than 7mm diameter) rarely pass. Observing large stones may increase the risk of infections and long-term kidney damage.
- **Extracorporeal shockwave lithotripsy (ESWL)** which involves “firing” shockwaves through your skin to break the stone into fragments which you then pass yourself. This is not appropriate for larger stones (greater than 15-20mm diameter).
- **Flexible ureteroscopy** which involves using a thin flexible telescope passed into your bladder, up through your ureter and into your kidney, where the stone is broken up using laser energy. For larger stones in particular, several procedures may be required.
- **Open or laparoscopic stone removal** - although very unusual nowadays, if all the above techniques fail we may rarely need to resort to open or laparoscopic (conventional keyhole) surgery to remove your stone(s).

## **What happens on the day of the procedure?**

Your urologist (or a member of their team) will briefly review your history and medications, and will discuss the surgery again with you to confirm your consent.

PCNL will require you to have a general anaesthetic. The anaesthetist will discuss this with you on the day of your surgery together with pain relief for after the procedure.

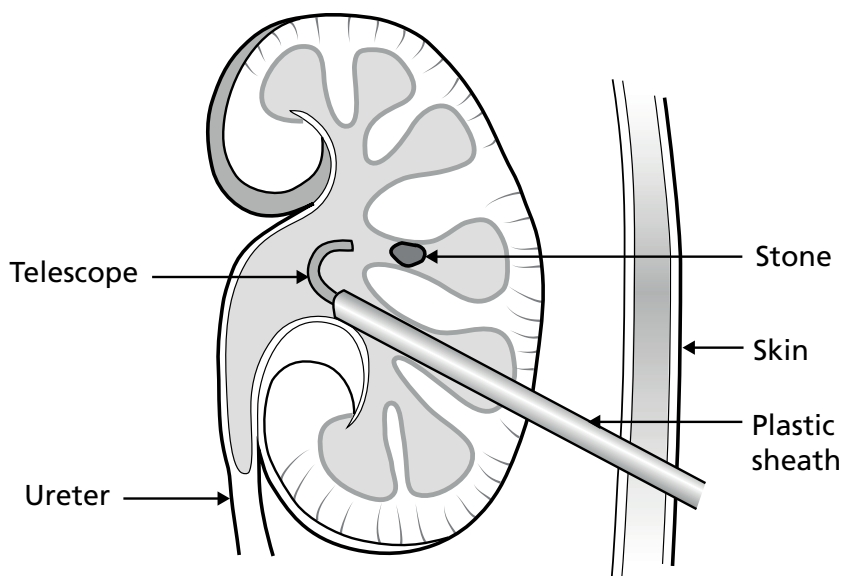
We may provide you with a pair of compression stockings to wear, and we may arrange to give you a heparin injection to thin your blood after surgery. These help to prevent blood clots from developing and passing into your lungs. Your medical team will decide whether you need to continue these after you go home.

A few days before your planned surgery or on your day of admission, we may arrange either a CT scan or abdominal X-ray, to be sure that the stone has not changed in any way.

## **Details of the procedure**

- We normally use a full general anaesthetic and you will be asleep throughout the procedure.
- We usually give you an injection of antibiotics before the procedure, after you have been checked for any allergies.
- We put a telescope into your bladder through the urethra (water pipe) and use it to put a fine ureteric catheter up to your kidney under X-ray guidance.
- We put a catheter into your bladder through your urethra (waterpipe) to allow your bladder to drain. This may be removed at the end of the procedure or sometimes on the first day after your operation.
- We then position you to get the best access to the affected kidney – this often requires turning you on to your face (prone position).

- We puncture the kidney with a needle using both X-ray and ultrasound guidance. Once the needle is correctly positioned, we replace it with a guide wire. This allows us to pass dilators into the kidney to stretch up the tract to the required size.
- A plastic sheath is placed over the dilating device which allows us to pass a telescope (nephroscope) down the sheath into the kidney to see the stone(s) (pictured).
- The size of the tract and sheath is determined by the size of telescope which we will use to see inside the kidney and also the size of the stone(s) we wish to treat.



**A diagram of a kidney**

- The stones are broken up using an ultrasound probe, pneumatic lithoclast and/or a laser. Much of the stone is sucked out as fine dust through the ultrasonic device, but larger fragments can be removed using grasping forceps.
- When smaller nephroscopes (mini or ultra-mini) are used, the stones are "dusted" to produce tiny fragments which can pass by themselves.

- We often insert a temporary drainage tube (a nephrostomy tube) into the kidney at the end of the procedure and in some cases an internal drain (a ureteric stent) is also required. Stents can cause some bladder irritation, and are temporary. Stents need removing between 2-6 weeks after your surgery, using a flexible telescope passed into your bladder (flexible cystoscopy). This will be done under local anaesthetic in the outpatient department. If you have a stent inserted, this will be explained to you and some additional information provided before you are discharged home.
- The procedure takes one to three hours to complete, depending on the size of your stone(s).
- You can expect to be in hospital for one to three days, occasionally slightly longer.

Within the first 48 hours after surgery, we may carry out an X-ray (or occasionally a CT scan) to see if all the stones have been cleared. However, more commonly we may X-ray your kidney using contrast medium (dye) put down the nephrostomy tube (a nephrostogram). If this is satisfactory, the nephrostomy tube will be removed.

You may get some leakage of urine from the nephrostomy site. This usually stops 24 to 48 hours after the nephrostomy drain is removed.

Further information and a short video of percutaneous kidney stone removal are available on the BAUS website.

## **Are there any after-effects?**

The possible after-effects and your risk of getting them are shown below. Some do not last for very long, and in most cases everything rapidly returns to normal, but other side effects can last longer and some are permanent. We have listed some very rare but important after-effects (occurring in less than 1 in 250 patients) individually. The impact of after-effects can vary a lot from patient to patient; you should

ask your surgeon's advice about the risks and their impact on you as an individual:

After-effect	Risk
Mild bleeding from the kidney into your nephrostomy tube and bladder	All patients
Temporary insertion of a bladder catheter	All patients
Recurrent (new) stone formation over the next five to 10 years, requiring further surgery or other treatment	1 in 2 patients (50%)
Urinary infection requiring antibiotic treatment	Between 1 in 2 and 1 in 10 patients (10 to 50%)
Need for more than one puncture to clear your stones (depending on the site and size of the stones)	Between 1 in 2 and 1 in 10 patients (10 to 50%)
Left over, or incompletely treated stones requiring further surgery or other treatment	Between 1 in 5 and 1 in 20 patients (5 to 20%)
Sepsis (infection) which may require an unexpected intensive care unit admission	Between 1 in 10 and 1 in 50 patients (2 to 10%)
Moderately severe bleeding from the kidney requiring further specialist x-ray guided procedures to block the blood supply to the damaged area (angiography and embolisation)	Between 1 in 50 and 1 in 100 patients (1 to 2%)
Failure to obtain satisfactory access to your kidney requiring further surgery or alternative treatment	Between 1 in 50 and 1 in 100 patients (1 to 2%)

<b>After-effect</b>	<b>Risk</b>
Infection in the nephrostomy puncture wound in your back	1 in 100 patients (1%)
Anaesthetic or cardiovascular problems possibly requiring intensive care (including chest infection, pulmonary embolus, stroke, deep vein thrombosis, heart attack and death)	Between 1 in 50 and 1 in 250 patients (your anaesthetist can estimate your individual risk) (0.4 to 2%)
Major damage to blood vessels in your kidney requiring emergency surgery to remove the kidney (nephrectomy)	Less than 1 in 1000 patients (less than 0.1%)

## **What is my risk of a hospital-acquired infection?**

Your risk of getting an infection in hospital is approximately 8 in 100 (8%); this includes getting MRSA or a Clostridium difficile bowel infection. This figure is higher if you are in a “high-risk” group of patients such as patients who have had:

- long-term drainage tubes (e.g. catheters);
- bladder removal;
- long hospital stays; or
- multiple hospital admissions.

## **What can I expect when I get home?**

- You will be given advice about your recovery at home
- You will be given a copy of your discharge summary and a copy will also be sent to your GP
- Any antibiotics or other tablets you may need will be arranged and dispensed from the hospital pharmacy



- You should drink twice as much fluid as you would normally for the first 24 to 48 hours, to flush your system through and reduce the risk of infection or blockage of your urine flow by blood clots
- It may take at least two weeks to recover from percutaneous nephrolithotomy
- You may return to work when you are comfortable enough and when your GP is satisfied with your progress; this is unlikely to be within 10 days, especially if your job is physically demanding, and could be as long as 4 weeks

You can reduce your risk of further stone formation by altering your diet and fluid intake. Ask your urologist for further details.

## **Is there anything I should look out for?**

If you develop any of the following symptoms:

- a fever
- pain in the area of the affected kidney
- severe pain on passing urine
- inability to pass urine
- worsening bleeding

you should contact your GP immediately.

## **General information about surgical procedures**

### **Before your procedure**

Please tell a member of the medical team if you have:

- an implanted foreign body (stent, joint replacement, pacemaker, heart valve, blood vessel graft);

- a regular prescription for a blood thinning agent (warfarin, aspirin, clopidogrel, ticagrelor, heparin injections, apixaban, rivaroxaban or dabigatran);
- a present or previous MRSA infection; or
- a high risk of variant-CJD (e.g. if you have had a corneal transplant, a neurosurgical dural transplant or human growth hormone treatment).

## **Questions you may wish to ask**

If you wish to learn more about what will happen, you can find a list of suggested questions called "Having An Operation" on the website of the Royal College of Surgeons of England.

You may also wish to ask your surgeon for his/her personal results and experience with this procedure.

BAUS runs a national audit and collects data from all urologists undertaking this surgery. There are two reasons for this. First, surgeons are required by the Department of Health to look at how well the surgery is being done under their care and, second, to look at national trends for the procedure.

Some basic patient data (e.g. name, NHS number and date of birth) are entered and securely stored. This is required so that members of the clinical team providing your care can go back to the record and add follow-up data such as length of stay or post-operative complications. This helps your surgeon to understand the various outcomes of the procedure.

Although BAUS staff can download the surgical data for analysis, they cannot access any patient identifiable data. This information is used to generate reports on individual surgeons and units; these are available for the public to view in the Surgical Outcomes Audit section of the BAUS website.

## **Before you go home**

We will tell you how the procedure went and you should:

- make sure you understand what has been done;
- ask if everything went as planned;
- let the staff know if you have any discomfort;
- ask what you can (and cannot) do at home;
- make sure you know what happens next; and
- ask when you can return to normal activities.

We will give you advice about what to look out for when you get home. We will also give you details of whom to contact, and how to contact them, in the event of problems.

## **Smoking and surgery**

Ideally, we would prefer you to stop smoking before any procedure. Smoking can worsen some urological conditions and makes complications more likely after surgery. For advice on stopping, you can:

- contact your GP;
- access your local NHS Smoking Help Online; or
- ring the free NHS Smoking Helpline on 0800 169 0169.

## **Driving after surgery**

It is your responsibility to make sure you are fit to drive after any surgical procedure. You only need to contact the DVLA if your ability to drive is likely to be affected for more than three months. If it is, you should check with your insurance company before driving again.

## What sources have we used to prepare this leaflet?

This leaflet uses information from consensus panels and other evidence-based sources including:

- the Department of Health (England);
- the Cochrane Collaboration; and
- the National Institute for Health and Care Excellence (NICE)

It also follows style guidelines from:

- the Royal National Institute for Blind People (RNIB);
- the Information Standard;
- the Patient Information Forum; and
- the Plain English Campaign.

## Contact details

Please contact the urology department if you have any questions or concerns before or after your procedure.

**Waiting list team** (for queries regarding your surgery appointment)

- 0114 271 3729

**Urology Assessment Unit** (nursing team)

- 0114 226 5149



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