University College Hospital at Westmoreland Street

Percutaneous nephrolithotomy (PCNL)
Urology Directorate
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1 Introduction

Some people are prone to stones forming in the kidney. Some of these do not give you any problems while others, if left untreated may grow and cause damage to the kidneys. Urine is made by the kidneys and drains into your bladder via narrow tubes called ureters, where it is stored until you empty it by urinating through your urethra or “water pipe”. A stone may form in the kidneys causing problems like blockage and pain. In these cases doctors recommend that the stones must be removed.

2 What is a Percutaneous Nephrolithotomy (PCNL)?

A percutaneous nephrolithotomy (PCNL) is a procedure to remove a kidney stone or stones. Percutaneous means ‘through the skin’ and nephrolithotomy means ‘taking stones out of the kidney’. The surgery is done telescopically.

This involves placing a kidney telescope called a nephroscope into the kidney via a small opening (incision) in the skin and using this instrument to remove the kidney stone(s).

3 How can a PCNL help me?

From the results of your tests, your doctor has confirmed that you have a stone or stones in your kidney. Not all kidney stones cause symptoms, but yours may have caused significant problems, such as pain, infection, or be at risk of doing so. If nothing is done to remove them, they will continue to grow and could damage your kidney.
What are the advantages of keyhole nephroscopic surgery?

Less blood loss. In the keyhole operation, blood loss is typically much less than open surgery. Therefore, there is less risk of needing a blood transfusion with keyhole nephroscopic surgery.

Less pain after the operation. As there is no large wound, patients need less strong painkillers following keyhole surgery and can return to normal activities and work sooner compared to open surgery.

A shorter stay in hospital. Most patients go home two to three nights after keyhole surgery, compared to an average of five to seven nights for open surgery.

Smaller scars. The keyhole operation avoids the large scar from open surgery, although the smaller scar from where the telescope enters the skin will be visible.

What happens during a PCNL?

This operation is carried out under general anaesthetic, which means you will be asleep throughout the procedure.

It is a joint procedure with two consultants: a consultant urologist and a consultant radiologist.

The operation begins by inserting a telescope-like instrument (known as a cystoscope) into the bladder. A tube is then passed up the ureter into the kidney. This tube allows the kidney to be filled with dye (contrast medium) to allow your surgeon to see the kidney with the X-ray machine in theatre.

Next you are moved into a prone position (lying face down). With the aid of X-ray and ultrasound, the kidney is punctured by the radiologist with a fine needle through your back. The needle position is confirmed by either outflow of urine or dye from the hollow needle. Once the kidney has been entered, a 1cm incision is made in the back and the needle tract into the kidney is then stretched (dilated) to allow a telescope to be passed into the kidney. A scope and other stone fragmentation tools such as a laser or an ultrasonic probe will be inserted through this tract for stone fragmentation and removal. The whole procedure usually takes approximately 2 hours.

After the operation, a temporary tube may be left in the kidney and a catheter may be left in the urethra (the tube which carries urine from your bladder and out of your body) to ensure good urinary drainage. If present these tubes are removed over the next few days depending on clinical progress and will be reviewed twice daily at least by the medical team.
6 What should I expect after a PCNL?

Once your procedure is over you will be taken to the recovery room and remain there until you come around from the anaesthetic. You may be in the recovery room for an hour or two. You will then be taken to your ward. If you are in pain or feel nauseous (sick) while in the recovery room, please let the staff know, as they can give you medicine to help with this.

You will need to remain in bed at first. During this time, we will ask you to move your feet and ankles and wiggle your toes to help encourage circulation in your legs. This and deep breathing will also reduce the risk of blood clots in your legs. Deep breathing also helps to prevent lung problems after your surgery.

If you have a drainage tube from your kidney, it will be attached to a collection bag to drain your urine. The urine will be blood-stained. The nurses will regularly empty the bag and measure the volume of urine produced. How long you need this tube depends on the amount of left-over fragments, clots, and other debris. It is often removed the day after your surgery, but you may need further tests to confirm when it is ready to be removed. You are likely to have a urethral catheter for the first few days after your surgery. This is a tube inserted into the bladder through your urethra (tube that carries urine from the bladder and out of the body). This may be uncomfortable; please tell us if it is so we can manage your discomfort.

The average stay in hospital for this surgery is two to three days after the operation.

7 What are the risks of having a PCNL?

All treatments and procedures have risks and we will talk to you about the risks of having a PCNL when you are seen in clinic.

These are:

Bleeding in or around the kidney. Some bleeding is normal; rarely it may be significant enough to need a blood transfusion (in less than 5% of cases). If the bleeding does not stop it may be necessary to have a specialist X-ray procedure called an embolisation to block the blood vessel that is bleeding.
This is done in the x-ray department. In the rare event that this does not stop the bleeding it can be necessary to remove the kidney (nephrectomy). This is extremely rare and happens in less than 1 in 1,000 cases.

**Infection.** Because some stones have bacteria trapped within them, we give you antibiotics routinely to prevent infection at the time of the operation. A raised temperature is common (25%) after this procedure, but this is usually temporary. There is a 0.5% risk of sepsis (blood poisoning).

**Retained fragments.** Sometimes it is not possible to remove all of the stone during the operation, and in these cases usually it will be necessary to undertake further treatment. This may involve either extracorporeal shock wave lithotripsy (ESWL) or surgical removal via the ureter (flexible ureteroscopy) or rarely repeating PCNL. Occasionally, to aid further treatments and ensure urine drains safely from the kidney to the bladder, a ureteric stent (a small hollow tube which goes down your ureter and into your bladder) is inserted at the end of PCNL.

**Fluid build-up.** Rarely fluid can leak from the kidney after surgery resulting in a collection of fluid inside your abdomen. It this becomes a large collection it may need draining. This is usually done in the X-ray department. In some cases a ureteric stent may also need to be inserted. Ureteric stents are left in temporarily until problems have been resolved and can then be removed usually within 6 weeks.

**Bowel perforation.** There is a possibility of damaging the bowel during the operation, although this is rare and happens in less than 1 in a 100 cases.

**Injury to the lung cavity.** There is a small chance of pockets of air or fluids forming around a lung if the needle is inserted toward the upper part of the kidney (this will have been decided by your surgeon and radiologist depending on where the stones are). These pockets are treated with a tube temporarily inserted into the chest, which allows the fluid or air to drain from around the lung.
Common occurrences (greater than 1 in 10)

- Temporary insertion of a urethral bladder catheter (tube draining urine from the bladder via your waterpipe) and ureteric stent/ kidney tube needing later removal
- Temporary blood in the urine
- Temporary raised temperature

Occasional risks (between 1 in 10 and 1 in 50)

- Occasionally more than one puncture site is required
- No guarantee of removal of all stones & need for further operations
- Recurrence of new stones
- Failure to successfully access the kidney resulting in the need for further surgery

Rare (less than 1 in 50)

- Severe kidney bleeding requiring transfusion, embolisation or at last resort surgical removal of kidney.
- Damage to lung, bowel, spleen, liver requiring surgical intervention.
- Kidney damage or infection needing further treatment
- Over-absorption of irrigating fluids into blood system causing strain on heart function

8 What are the risks of a general anaesthetic?

If you require a general anaesthetic there are a number of issues that affect the chances of suffering complications, including: age, weight, lifestyle issues and your general state of health. Your anaesthetist and/or your surgeon can give further details. The information below on risks is provided by the Royal College of Anaesthetists.
• **Very common (1 in 10) and common (1 in 100) side effects**
  Feeling sick and vomiting after surgery
  Sore throat
  Dizziness and feeling faint
  Headache
  Shivering
  Chest infection
  Itching
  Bladder problems
  Aches, pains and backache
  Pain during injection of drugs
  Bruising and soreness
  Confusion or memory loss—It usually recovers but this can take some days, weeks or months

• **Uncommon side effects and complications (1 in 1000)**
  Muscle pains
  Slow breathing (depressed respiration)
  Damage to teeth, lips or tongue
  An existing medical condition getting worse
  Awareness (becoming conscious during your operation)
  Damage to the eyes
  Nerve damage

• **Rare (1 in 10,000) or very rare (1 in 100,000 or less) complications**
  Serious allergy to drugs
  Damage to nerves in the spine
  Death
  Equipment failure

Deaths caused by anaesthesia are very rare, and are usually caused by a combination of four or five complications together. There are probably about five deaths for every million anaesthetics in the UK.
9 Asking for your consent

We want to involve you in all the decisions about your care and treatment. If you decide to go ahead with treatment, by law we must ask for your consent and will ask you to sign a consent form. This confirms that you agree to have the procedure and understand what it involves. Staff will explain all the risks, benefits and alternatives before they ask you to sign a consent form. If you are unsure about any aspect of your proposed treatment, please don’t hesitate to speak with a senior member of staff again.

10 How should I prepare for a PCNL?

You will attend a pre-assessment clinic before your surgery. It is very important that you come to this appointment, as this is when we will assess your suitability and fitness for surgery and anaesthetic. We will carry out a number of tests to make sure that your heart, lungs and kidneys are working properly. You may have a chest X-ray, ECG (electrocardiogram) which records the electrical activity of your heart and some blood and urine tests. Your doctor will explain any tests you need further. If you do not attend, we may have to cancel your surgery.

If you smoke, you may be asked to stop smoking, as this increases the risk of developing a chest infection or deep vein thrombosis (DVT). Smoking can also delay wound healing because it reduces the amount of oxygen that reaches the tissues in your body. If you would like to give up smoking, please speak to your nurse or call the NHS Smoking Helpline on 0800169 0 169.

You will be given special advice if you take warfarin, aspirin®, clopidogrel,Rivaroxiban, Apixiban or any other medication that might thin your blood. Do not make any changes to your usual medicines, whatever they are for, without consulting your specialist first. Please bring all of the medicines that you currently take or use with you, including anything that you get from your doctor on prescription, medicines that you have bought yourself over the counter, and any alternative medicines, such as herbal remedies.

We will send you information about fasting. Fasting means that you cannot eat anything for six hours or drink anything for two hours before surgery( if you have not received clear instructions about fasting please email us at stones.team@uclh.nhs.uk). We will give you clear instructions about when to start fasting. It is important to follow the instructions. If there is food or liquid in your stomach during the anaesthetic it could come up to the back of your throat and damage your lungs.
11 What should I expect when I go home?

You may experience some blood in your urine for up to two weeks. Make sure you drink plenty of fluids to help with this. Aim to drink two to three litres (about three and a half pints or eight cups) of water, squash or fruit juice each day. We recommend that you do not drink more than two cups of tea or coffee each day. We suggest that you avoid drinking alcohol while you are recovering.

- You may feel sore around the operated area for several weeks; we will prescribe you painkillers to help with this.
- Avoid becoming constipated by eating a healthy, balanced diet, as straining to open your bowels increases the risk of bleeding. Eat plenty of fruits and vegetables and other foods high in fibre, such as wholemeal bread, pasta and rice. If you need more advice about your diet, please speak to your doctor or nurse.
- Avoid lying down for long periods, as reduced movement increases the risk of developing pneumonia or blood clots in your legs.
- Avoid heavy lifting and straining for four weeks.
- The dressing over the wound site should be changed daily and the site inspected for healing. Never leave a wet dressing in place. Once the wound is dry and healed (usually within 3 – 5 days) the dressing can be removed. The ward nurses will either contact the district nursing team to organise changing of the dressing or (more commonly) you can see your GP Practice Nurse for this.
- Give yourself two to four weeks before returning to work. If your work involves heavy lifting or exercise, please speak to your consultant.
- Only start driving again when you are able to perform an emergency stop without feeling hesitant. Check with your insurance company to make sure you are covered to start driving again.

14 When can I have sex again?

You may begin sexual activity again two weeks after your operation, as long as you feel comfortable.
13 Will I have a follow-up appointment?
You will have an appointment to come to clinic on .......... .......... (ask your medical team to fill this in before you are discharged).
If you have not received an appointment please call or email your team’s PA. Contact details are at the end of this booklet.

14 Contact your GP (general practitioner) if:
Please contact your GP if you experience any of the following after you have left hospital:

- persistent bleeding or leaking of urine from the operation site
- fresh blood in your urine (unless you have a stent)
- excessive pain
- a temperature over 38ºC (100.4F)
- difficulty passing urine
- you have any other problems that concern you.

If you need to see someone urgently out of hours and cannot contact your GP you will need to go to your nearest Accident and Emergency department.

15 What will happen if I choose not to have PCNL?
If you decide not to have a PCNL, the doctor will talk to you about your options. Keep in mind that some alternatives may not give as good an outcome as PCNL or you may not be suitable to have the alternatives. Not having the treatment may result in long term damage to the kidney.
16 What alternatives are available?

The consultant caring for you has recommended that a PCNL is the most suitable option to remove your stone(s). However there are some alternatives. Possible alternatives include:

Extracorporeal shock wave lithotripsy (ESWL)
This involves shattering your stones using shock waves. The stones break up into smaller fragments which you then pass out in your urine. This is usually done as a course of treatments in outpatients.

Flexible ureterorenoscopy (Flexible URS).
A telescope is inserted into your waterpipe, into your bladder and up the ureter into the kidney under general anaesthetic. The stone can then be removed with a special instrument, or broken using laser and then the fragments removed.

Open surgery
This involves the stones being removed via an opening in your side rather than using the telescope via the skin as in PCNL

A PCNL generally removes more stone fragments than ESWL and URS and has a shorter recovery time than open surgery. However, this will depend on your individual circumstances e.g. the size of the stone and where it is positioned in your kidney. Your consultant will discuss these alternatives with you in more detail if they are appropriate for you. Please ask questions if you are uncertain.
17 Where can I get more information?

**NHS Direct**
www.nhsdirect.nhs.uk
☎️ 0845 46 47

**Patient UK**
www.patient.co.uk

**NHS Choices** Provides online information and guidance on all aspects of health and healthcare, to help you make choices about your health.

www.nhs.uk

UCL Hospitals cannot accept responsibility for information provided by other organisations.

18 Contact details

Switchboard: 0845 155 5000 or 020 3456 7890
Ask switchboard to put you through to your surgical team’s PA in the Directorate of Urology
or
contact the Endourology and Stone team on their direct line: 020 3447 9179
stones.team@uclh.nhs.uk

19 Acknowledgement

Some information taken from the BAUS and Guys and St Thomas’s patient information leaflets – with thanks.

Anaesthetic information provided by the Royal College of Anaesthetists (www.rcoa.ac.uk)
20 How to find us:

University College Hospital
University College Hospital at Westmoreland Street

1. University College Hospital
2. University College Hospital Macmillan Cancer Centre
3. UCLH HQ (250 Euston Road)
4. University College Hospital at Westmoreland Street
Space for notes and question