



PCNL

Definition

Percutaneous = “through the skin”

Nephro = “kidney”

Lithotomy = “stone breakage and removal”

Essentially, a PCNL is just that, removing a kidney stone through a hole in your back. Before the invention of endoscopic (through-the-scope) procedures, very large kidney stones would be removed through an incision (open operation). Although this is still sometimes performed, open operations for stones are now rarely necessary.

We attempt to remove most kidney stones with shock wave lithotripsy. This is a noninvasive procedure involving external shock waves. Other stones in the kidney or ureter (tube extending from the kidney to the bladder) can be successfully treated with ureteroscopy (a procedure in which a scope is passed from the urethra, into the bladder, and up the ureter into the kidney). In this operation, no incisions are made in the skin.

When a stone is very large, moderately large, and located in certain parts of the kidney, or have been unsuccessfully treated with the above-mentioned procedures, a PCNL is commonly recommended.

Preparation

As with any procedure in which anesthesia is administered, you will be asked not to eat or drink anything after midnight on the evening prior to your surgery. You may brush your teeth in the

morning, but do not swallow the water. If you are on medications that must be taken, you will have discussed this with us and/or the anesthesiologist. Instructions will have been given to you. The procedure will not be performed if you are currently taking or have recently taken any medications that may interfere with your ability to clot your blood (blood thinners, aspirin, plavix, Coumadin, anti-inflammatory medications, etc.) The most common of these medications are aspirin and all related pain relievers or anti inflammatory compounds (whether prescription or over the counter). Please refer to the attached list and tell us if you took any of the the medications within the last 7 days. We will have reviewed all of your current medications with you during the pre operative consultation. You are obligated to inform us if anything has changed since your previous visit.

Procedure

To review the basics of what we discussed in the office: Some urologist place the initial tube into your kidney at the time of the procedure. Other urologists ask the interventional radiology team to place the initial tube the day or 2 prior to the day of your actual procedure. This initial tube (the nephrostomy tube) is called the “access” because it is the tube that will allow us to access the center of your kidney during the procedure. If your tube is being placed prior to your procedure, it will likely be in place 1-2 days before you actually have the scheduled PCNL.

The actual procedure can take anywhere from 1-3 hours depending on the stone size and location. The anatomy of your kidney will also contribute to the operative time. Once under general anesthesia, you will be placed lying facedown with cushions and supports. We dilate (spread open) the access tract up to the size of a nickel until we can fit our nephroscope (scope that goes into the kidney) inside. Using a combination of direct vision through the scope as well as x-ray guidance, we advanced the scope directly up to the stone. Depending on the location, size, and consistency of the stone, the surgeon may elect to use one or a combination of technologies or instruments to break the stone and remove any significant fragments. When we are finished removing as much stone as is safely possible, we placed a tube into the tract. This will assist with tamponing (holding pressure) any bleeding. In some cases, we may also elect to place a stent (small plastic tube that goes from the kidney all the way down to the bladder) in the ureter.

Post Procedure

After the procedure, you will be in the recovery room until you are ready to be sent to your room. Your back may be sore where we made a small hole for the scope and where you now have a tube. We may leave a catheter in the bladder overnight. It is common to have a sense of urinary urgency from the catheter. Patient’s may have no blood in the urine, mild blood, or even what appears to be a significant amount of blood or small clots. The blood usually disappears

within a few days. You may also notice stone fragments in the urine. Because they're small, a patient typically does not feel them as they pass in the urine.

Although the stent is soft plastic, any degree of sensation from its presence is possible. Some patients have no feeling, while on the other extreme, some have bothersome symptoms. The symptoms can be any one or a combination of back or groin discomfort, urinary frequency, urgency, or burning. The symptoms may only last 1 day or persist for the duration of the presence of the stent. Most patients, however, have very mild symptoms that are tolerable.

In the next day or 2, we may take an x-ray with dye injected into the tube in your back. If everything looks acceptable, we will remove the drainage tube in your back and send you home with detailed follow-up instructions. You will have a gauze dressing on your back that will need to be changed 1 or a few times over the next 24-48 hours. Urine may leak from this hole for a few days, and then should stop on its own. If a stent was placed in your procedure, you will be discharged with that tube inside your kidney and ureter. Sometimes, we may leave the tube in the kidney when you go home. It will be connected to a drainage bag or have a cap in the end of it. We will remove it in the office as an outpatient procedure. If another procedure is necessary, we may leave the tube in for future use.

Expectations of Outcome

It is important that you understand the possible outcomes of the procedure. While our intent is to fragment the stone into small pieces, this is not always possible. There are occasional instances in which the scope cannot be passed safely into the kidney despite what appeared to be adequate access. We would not force the scope in as this could cause significant injury to the kidney or surrounding organs. In this instance, we would terminate the procedure, and the next step would be discussed in a follow-up consultation. Another obstacle may be that the composition of the stone is too hard to fragment. Alternatively, part or all of the stone may be situated in an area that is not readily or safely approachable. Sometimes, small fragments of the stone can be pushed down into the ureter by the water recurrent (from the scope) or from the attempt to break it. If it cannot be safely accessed or adequately broken, a stent may be placed and a different type of procedure might be planned for another day. In this regard, treatment for a larger, complex down to sometimes referred to as a "staged procedure" because it is done in different stages. Lastly, open surgery could be necessary to fully remove the stone.

Possible Complications

All surgical procedures, regardless of complexity or time, can be associated with unforeseen problems. They may be immediate or even quite delayed in presentation. While we have discussed these and possibly others in your consultation, we would like you to have a list so that you may ask questions if you are still concerned. Aside from the anesthesia complications,

it is important that every patient be made aware of all possible outcomes which may include, but are not limited to:

- Blood Loss/Transfusion: Because the scope and the stone traumatize small blood vessels, there is always minor to moderate blood loss expected. In some instances, blood loss is more severe and could possibly necessitate a transfusion.
- Renal infarction/loss of kidney: Sometimes the scope or stone instruments can traumatize an important blood vessel supplying a portion of the kidney. If this occurs, part of the kidney could die. If there is a major vascular injury, it could necessitate an emergent procedure by the interventional radiologist to clot off the vessel. In an extreme situation, an open operation to correct the problem or even remove the kidney entirely may be the only way to control the bleeding.
- Urine leak: As described, this operation requires entering through a hole in the kidney. The tubes placed at the end of the case are there to allow healing of the hole. Typically, this hole closes after 1-3 days. Sometimes, there may be a leak for a longer period. While the vast majority of these leaks stop within a few days, persistent leaks may require additional minimally invasive procedures or repeat minor operations. This complication can present immediately or even weeks later.
- Pneumothorax (collapse of the lung): The kidneys lie close to the chest cavity. Using any of the 3 methods, it is possible to enter the lung cavity and cause collapse of the lung. It may be necessary to place a tube in the side of the chest wall to allow the lung to reinflate. The tube will usually be removed in a few days. Occasionally, fluid from the procedure can accumulate around the lung. This is termed a "hydrothorax." The treatment would be a tube placed into the chest cavity.
- Liver or spleen injury: Kidneys that have had infections can sometimes be directly adjacent to or even adherent to surrounding organs. On the right side, the liver is close to the kidney. On the left side, the spleen is close to the kidney. During placement of the initial catheter or scope into the kidney, either organ can be injured. The injury may be small and easily repaired. A significant injury can increase the incidence of transfusion. It is extremely rare for part or all of an organ to necessitate removal. Open surgery may be necessary for these repairs and a general surgery would be consulted to assist.
- Injury to the small intestine or colon: The kidneys lie in close proximity to portions of the small intestine and the colon. If the scope inadvertently exits the kidney, it can cause injury to these structures. If immediately recognized, we would terminate the procedure. An open abdominal operation would then be performed. A significant injury could necessitate a temporary colostomy.
- Deep Vein Thrombosis/Pulmonary Embolism: In any operation, you can develop a clot in a vein of your leg (DVT). Typically, this presents 2-7 days after the procedure as pain, swelling, and tenderness to the touch in the lower leg (calf). Your ankle or foot can become swollen. If you notice these signs, you should go directly to an emergency room and call our office. Although less likely, this blood clot can move through the veins and block part of the lung (PE). This would present as shortness of breath and possibly

chest pain. We may sometimes ask the medical doctors to be involved with the management of either of these problems.

- Urinary Tract Infection or UroSepsis: Although we may give you antibiotics, it is still possible for you to get an infection. It may be a simple bladder infection that presents with symptoms of burning with urination, urinary frequency, and a strong urge to urinate. This will usually resolve within a few days of antibiotic administration. Pyelonephritis represents a kidney infection and is also possible following a PCNL and is more likely to cause symptoms of severe back pain, fevers, chills, nausea and vomiting. If the infection enters the bloodstream, you might feel very ill. This type of infection can present with both urinary symptoms and any combination of the following: fever, shaking chills, weakness, dizziness, nausea and vomiting. You may require a short hospitalization for intravenous antibiotics, IV fluids, and observation. This problem is more common in diabetics, patients on steroids, or patients with a weakened immune system. If you have symptoms suggesting any of the above after your discharge from the hospital or surgery center, you must contact us immediately and go to the nearest emergency room.
- Ureteral Injury: In an attempt to get the portion of the stone heading down the ureter, this delicate structure may be injured from the scope or from the instruments employed to break or remove your stone. The solution is typically to terminate the procedure, place a stent, and allow the tissue to heal itself over the next week or 2. A complete separation of the ureter from the kidney is a very rare occurrence and requires open surgery through an incision to repair the injured organ.

We provide this information for the patients and family members. It is intended to be an educational supplement that highlights some of the important points of what we have previously discussed in the office. Alternative treatments, the purpose of the procedure, and the points on this page have been covered in face-to-face consultation.