

## Ureteral Stenting and Nephrostomy

Ureteral stenting and nephrostomy help restore urine flow through blocked ureters and return the kidney to normal function. Ureters are long, narrow tubes that carry urine from the kidneys to the bladder. They can become obstructed – and urine flow blocked – as a result of various conditions. Your doctor may use image guidance to place a thin, flexible tube called a stent into the ureter to restore urine flow. If a stent cannot be placed, he may perform a nephrostomy, during which a tube is placed through the skin into the kidney and connected to either an external drainage bag or the bladder for internal drainage.



Tell your doctor if there is a possibility you are pregnant and discuss any recent illnesses, medical conditions, allergies and medications you're taking. Your doctor may advise you to stop taking aspirin, nonsteroidal anti-inflammatory drugs (NSAIDs) or blood thinners several days prior to your procedure and instruct you not to eat or drink anything after midnight the night before. Take regular medication with sips of water. Leave jewelry at home and wear loose, comfortable clothing. You may be asked to wear a gown. If you are not to be admitted to the hospital, plan to have someone drive you home afterward.

## What are Ureteral Stenting and Nephrostomy?

Urine is normally carried from the kidneys to the bladder through long, narrow tubes called ureters. The ureter can become obstructed due to conditions such as kidney stones, tumors, infection, or blood clots. When this happens, physicians can use image guidance to place stents or tubes in the ureter to restore the flow of urine to the bladder.

A ureteral stent is a thin, flexible tube threaded into the ureter. When it is not possible to insert a ureteral stent, a nephrostomy is performed. During this procedure, a tube is placed through the skin on the patient's back into the kidney. The tube is connected to an external drainage bag or from the kidney to the bladder for internal drainage.

## How should I prepare?

You may have blood drawn prior to your procedure.

Prior to your procedure, your blood may be tested to determine how well your kidneys are functioning and whether your blood clots normally.

Tell your doctor about all the medications you take, including herbal supplements. List any allergies, especially to local anesthetic, general anesthesia or to contrast materials. Your doctor may tell you to stop taking aspirin, nonsteroidal anti-inflammatory drugs (NSAIDs) or blood thinners before your procedure.

Tell your doctor about recent illnesses or other medical conditions.

Women should always inform their physician and x-ray technologist if there is any possibility that they are pregnant. Many imaging tests are not performed during pregnancy so as not to expose the fetus to radiation. If an x-ray is necessary, precautions will be taken to minimize radiation exposure to the baby. See the Safety page (<http://www.radiologyinfo.org/en/info/safety-radiation>) for

*more information about pregnancy and x-rays.*

In general, you should not eat or drink anything after midnight the day of your procedure. However, you may take your routine medications with sips of water. If you are diabetic and take insulin, you should talk to your doctor as your usual insulin dose may need to be adjusted.

You will be given a gown to wear during the procedure.

Plan to have someone drive you home after your procedure.

## What does the equipment look like?

During ureteral stenting, a fluoroscope and a guide wire are used to place a stent into the ureter.

A guide wire may be inserted with the aid of a fluoroscope, an imaging device that uses x-rays to see structures on a fluorescent screen.

A stent is 10 to 15 inches long and less than a quarter inch thick.

During a nephrostomy, a fluoroscope, or an ultrasound, and a needle are used to place a catheter in the kidney.

A catheter is a long, thin plastic tube that is considerably smaller than a "pencil lead", or approximately 1/8 inch in diameter.

Ultrasound scanners consist of a computer console, video display screen and an attached transducer. The transducer is a small hand-held device that resembles a microphone. Some exams may use different transducers (with different capabilities) during a single exam. The transducer sends out inaudible, high-frequency sound waves into the body and then listens for the returning echoes. The principles are similar to sonar used by boats and submarines.

The technologist applies a small amount of gel to the area under examination and places the transducer there. The gel allows sound waves to travel back and forth between the transducer and the area under examination. The ultrasound image is immediately visible on a video display screen that looks like a computer monitor. The computer creates the image based on the loudness (amplitude), pitch (frequency) and time it takes for the ultrasound signal to return to the transducer. It also takes into account what type of body structure and/or tissue the sound is traveling through.

Other equipment that may be used during the procedure includes an intravenous line (IV), ultrasound machine and devices that monitor your heart beat and blood pressure.

## How are these procedures performed?

Image-guided, minimally invasive procedures such as ureteral stenting and nephrostomy are most often performed by a specially trained interventional radiologist in an interventional radiology suite or occasionally in the operating room.

This procedure is often done on an outpatient basis. However, some patients may require admission following the procedure. Ask your doctor if you will need to be admitted.

Prior to your procedure, ultrasound, computed tomography (CT) or magnetic resonance imaging (MRI) may be performed.

You may be given medications to help prevent nausea and pain, and antibiotics to help prevent infection.

You may be connected to monitors that track your heart rate, blood pressure, oxygen level and pulse.

A nurse or technologist will insert an intravenous (IV) line into a vein in your hand or arm to administer a sedative. This procedure may use moderate sedation. It does not require a breathing tube. However, some patients may require general anesthesia.

If you receive moderate sedation, you will be asleep but have the ability to be awakened. The sedation will be administered and monitored by your physician and nursing staff.

If you receive a general anesthetic, you will be unconscious for the entire procedure, and you will be monitored by an anesthesiologist. If you receive conscious sedation, you will be monitored by a nurse who will administer medications to make you drowsy and comfortable for the procedure.

The area of your body where the catheter is to be inserted will be sterilized and covered with a surgical drape.

Your physician will numb the area with a local anesthetic. This may briefly burn or sting before the area becomes numb.

The interventional radiologist will use x-rays and/or ultrasound to locate your kidney and a needle will be inserted through your skin into the kidneys. Contrast material will be injected through the needle.

During ureteral stenting, you are positioned on your stomach. Using a fluoroscope to see the ureter, a guide wire is inserted into the ureter. The stent is run over the guide wire and placed in its permanent position within the ureter. Once the stent has been placed, the guide wire may be removed, or a nephrostomy catheter may be left in place for a day or two and then removed.

When the procedure is complete, the catheter is removed and pressure is applied to stop any bleeding. Sometimes, your doctor may use a closure device to seal the small hole in the artery. This will allow you to move around more quickly. No stitches are visible on the skin. The tiny opening in the skin is covered with a dressing.

During nephrostomy, you are positioned on your stomach. Using a fluoroscope to see the kidney, a guide wire is inserted into the kidney, followed by a catheter. This will be left in place until a ureteral stent can be placed or the ureteral blockage is resolved. Most commonly, the nephrostomy catheter is connected to an external bag that collects urine. Prior to leaving the hospital, you will be instructed on how to empty and care for the drainage bag. For prolonged durations, the catheter may require routine check and changes every two to three months.

Your IV line is removed before you go home.

Both procedures are usually completed within one hour.

## **What will I experience during and after the procedure?**

Devices to monitor your heart rate and blood pressure will be attached to your body.

You will feel a slight pinch when the needle is inserted into your vein for the IV line and when the local anesthetic is injected. Most of the sensation is at the skin incision site. This is numbed using local anesthetic. You may feel pressure when the catheter is inserted into the vein or artery. However, you will not feel serious discomfort.

If the procedure is done with sedation, the intravenous (IV) sedative will make you feel relaxed, sleepy and comfortable for the procedure. You may or may not remain awake, depending on how deeply you are sedated.

You may feel slight pressure as the catheter is inserted into the kidney and down the ureter. During placement of a ureteral stent, until the stent is positioned, you may feel pressure as the guide wire is inserted into the bladder resulting in a sensation to urinate. You may experience blood-tinged urine for several days following the procedure, which will usually clear up on its own.

You will remain in the recovery room until you are completely awake and ready to return home.

You will not feel when the contrast is excreted into the urine.

You should be able to resume your normal activities within a few days.

## Who interprets the results and how do I get them?

The interventional radiologist can advise you as to whether the procedure was a technical success when it is completed.

Your interventional radiologist may recommend a follow-up visit.

This visit may include a physical check-up, imaging exam(s) and blood tests. During your follow-up visit, tell your doctor about any side effects or changes you have noticed.

## What are the benefits vs. risks?

### Benefits

- A ureteral stent or nephrostomy catheter will allow urine to flow again from the kidney and permit the kidney to function normally.

### Risks

- Any procedure where the skin is penetrated carries a risk of infection. The chance of infection requiring antibiotic treatment appears to be less than one in 1,000.
- Rarely, you may experience ongoing spasm of the bladder after placement of a ureteral stent. If this happens, notify your doctor. This spasm may be treated with medication.
- Because the kidney is an organ with a substantial amount of blood flow to it, bleeding is a possible but rare complication. There is also a small risk of damage to surrounding organs. Imaging guidance is used to minimize this risk.
- There is a very slight risk of an allergic reaction if contrast material is injected.

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