PROCEDURE

Ureteral retrograde brush biopsy

A ureteral retrograde brush biopsy collects cells from inside a ureter for laboratory testing.

PURPOSE
Collect cells from a suspicious area of the ureter

PROCEDURE TYPE
Diagnostic, minimally invasive endoscopic cell sampling

WHERE IT IS DONE
Operating theatre or endoscopy suite

ANAESTHESIA
General, or deep sedation in selected cases

HOW LONG IT TAKES
Often 30 to 60 minutes

PREPARATION
Fasting, urine testing, and possible blood-thinner changes

RECOVERY
Same day; no driving for 24 hours after anaesthesia

MAIN RISKS
Infection, bleeding, ureter injury, inadequate sample

RESULTS
Visual findings immediately; laboratory results within days

Overview

A ureteral retrograde brush biopsy collects cells from the lining of a ureter. The ureters are the two tubes that carry urine from your kidneys to your bladder.

"Retrograde" means that the instruments travel upward from the bladder into the ureter, against the usual direction of urine flow. A thin brush is rubbed gently over an abnormal-looking or narrowed area. The collected cells are examined in a laboratory.

The procedure is usually performed through a cystoscope, a narrow viewing instrument passed through the urethra into the bladder. It may be combined with a retrograde pyelogram, which uses contrast dye and X-rays to outline the ureter, or with ureteroscopy, which uses a small camera to look directly inside it.

Although it is called a biopsy, brushing mainly collects loose cells rather than a larger piece of

tissue. This can limit how much the laboratory can learn from the sample.

Why the procedure is performed

Your healthcare team may recommend this procedure when a scan, urine test, or previous examination shows a possible problem inside a ureter.

Reasons may include:

The results may help your team decide whether you need surveillance, another biopsy, endoscopic treatment, or surgery. A brush sample can help identify abnormal cells, but it may not show how deeply a growth has entered the ureter wall.

- A narrowing, blockage, or irregular area in the ureter
- A filling defect, meaning an area where contrast dye does not fill normally
- Blood in the urine without a clear explanation
- Abnormal cells found in a urine cytology test
- Concern about urothelial cancer, which starts in the urinary tract lining
- The need to distinguish cancer from inflammation, scarring, or another condition

Who should and should not have it

This procedure may be suitable when cell sampling is likely to clarify an uncertain scan or urine test and the result could change your treatment.

It is not the right test for everyone. It may be delayed if you have an untreated urinary tract infection because passing instruments into the ureter could spread the infection. A urine sample is often checked beforehand.

The procedure may also be delayed or adapted if you:

Contrast allergy or kidney disease does not always prevent the procedure. Your team may use another approach or limit contrast exposure.

Brush sampling may not be useful when the sample is unlikely to change the treatment plan. In some cases, a forceps biopsy, repeat imaging, or surgery may provide more useful information.

- Have a bleeding problem that has not been corrected
- Take blood-thinning medicine that cannot safely be paused

- Are not currently well enough for the planned anaesthesia
- May be pregnant, because X-rays are often used
- Have a severe contrast allergy or reduced kidney function
- Have urinary anatomy that makes the ureter difficult to reach safely

How to prepare

Follow the treating facility's own instructions, because they take priority over general information.

You will usually be told when to stop eating and drinking before anaesthesia. Do not eat or drink outside those instructions, including sweets or chewing gum.

Give your team a current list of medicines, vitamins, and supplements. Tell them if you take an anticoagulant or antiplatelet medicine, sometimes called a blood thinner like warfarin or apixaban . Examples include warfarin, apixaban, rivaroxaban, dabigatran, clopidogrel, and aspirin. Do not stop one unless the team responsible for the procedure tells you to do so.

Tell the facility if you:

A urine test may be arranged. If it shows an infection, treatment and a new procedure date may be needed.

Arrange for a responsible adult to take you home. You may also need someone to stay with you after a general anaesthetic or deep sedation.

- Have symptoms of a urinary infection
- Have had a reaction to contrast dye, antibiotics like amoxicillin or doxycycline , or anaesthesia
- Have kidney, heart, lung, or bleeding problems
- Could be pregnant
- Have a ureteral stent or other urinary implant

What happens during the procedure

After confirming your identity, procedure, and consent, the team gives you the planned anaesthesia. You are usually positioned on your back with your legs supported.

The urologist passes a lubricated cystoscope through your urethra into the bladder. There is no

skin incision. The opening of the affected ureter is identified.

A fine catheter or guidewire is passed upward into the ureter. Contrast may be injected while X-ray images are taken. This helps show the position of a narrowing or other abnormal area.

The urologist then guides a small brush to that area. The brush is moved across the lining to collect cells and is withdrawn carefully. The sample is sent to the laboratory, often in a container of preservative fluid.

The team may also collect urine washings or take a small tissue sample with forceps. If the ureter is swollen, narrow, or has been instrumented extensively, a temporary ureteral stent may be inserted to keep urine draining. A stent is a thin tube running between the kidney and bladder.

The procedure often takes 30 to 60 minutes. It may take longer if ureteroscopy, another biopsy, or treatment is performed at the same time.

Recovery and what to expect afterward

Mild burning when you urinate, bladder irritation, or an aching pain in the side can occur afterward. Your urine may look pink or contain a small amount of blood. A stent can cause urinary urgency, frequent urination, or discomfort in the kidney area, especially while urinating.

You can usually drink and eat once you are awake and not feeling sick. Follow any fluid advice from your team. Do not force extra fluids if you normally have a fluid restriction.

Plan to rest for the remainder of the day. Light activity is often possible the next day, but avoid strenuous exercise until bleeding and discomfort have settled or for as long as your team advises.

Do not drive for at least 24 hours after general anaesthesia or deep sedation. Do not drive while taking medicine that makes you sleepy or if pain limits your ability to brake safely. Your facility may require a longer restriction.

Many people return to desk work within one or two days. You may need longer if your work is physical, you have a stent, or another procedure was performed.

Risks and possible complications

Possible risks include:

A negative or unclear result does not always rule out disease. Brush samples contain cells but little supporting tissue, so they may not show how deeply an abnormality extends.

More serious infection, significant ureter injury, or heavy bleeding can occur and may require hospital care, a stent, or another procedure.

- Urinary tract infection
- Bleeding in the urine
- Pain or bladder irritation
- Injury or a small tear in the ureter
- Later scarring and narrowing of the ureter
- Temporary blockage caused by swelling or a blood clot
- Reactions to anaesthesia, antibiotics, or contrast dye
- Failure to reach the abnormal area
- A sample that is too small or unclear for diagnosis

Results and follow up

The urologist may tell you what the ureter looked like soon after the procedure. The brush sample itself must be processed and examined by a pathologist, a doctor who studies cells and tissue.

Laboratory results commonly take several days and may sometimes take one to two weeks. Ask how and when the facility will contact you.

A report may describe the cells as benign, atypical, suspicious, malignant, or inadequate. "Atypical" means that some cells look unusual but the findings do not clearly establish cancer. "Inadequate" means there were not enough useful cells to reach a conclusion.

Your follow-up plan may include urine testing, imaging, ureteroscopy, a different type of biopsy, surveillance, or treatment. Keep routine appointments even if you feel well, because follow-up is based on the findings rather than symptoms alone.

Alternatives

The useful alternatives depend on what your team needs to learn.

Ask what information each option is expected to provide and how the result would change your care.

- CT urography: Provides detailed images of the kidneys and ureters without inserting a scope. It involves radiation and usually contrast dye, and it cannot provide cells or tissue.
- MR urography: Avoids ionising radiation and may be used when CT contrast is unsuitable. It may provide less detail for some small urinary tract abnormalities and does not provide a biopsy.
- Urine cytology: Tests cells passed naturally into urine. It is easy to collect but may miss some tumours, particularly low-grade ones, and may not show where abnormal cells came from.
- Ureteroscopic forceps biopsy: Removes a small piece of tissue, which may give more information about tissue structure. It can be harder to perform in a narrow ureter and carries a risk of injury or an inadequate sample.
- Repeat imaging or observation: Avoids an immediate invasive test but may delay a diagnosis or allow an abnormality to change between checks.
- Surgery without a prior brush biopsy: May be considered when imaging and other findings already strongly support treatment. It gives a larger specimen but is far more invasive and may involve removing part or all of the ureter and kidney.

When to call your healthcare team

Contact your healthcare team promptly if burning, bleeding, or pain is getting worse rather than gradually improving. Also call if you have ongoing stent discomfort that is not controlled by the recommended measures.

Seek same-day medical advice for:

Seek emergency help for severe breathing difficulty, chest pain, fainting, confusion, uncontrolled bleeding, or severe pain with marked illness.

Your discharge instructions should provide the appropriate daytime and after-hours contact numbers.

- Fever or shaking chills
- Increasing pain in your side or back
- Cloudy or foul-smelling urine with worsening urinary symptoms
- Repeated vomiting or inability to drink
- Heavy bleeding, large clots, or difficulty passing urine

Common questions

Will I be asleep?

Most people have a general anaesthetic and are fully asleep. Deep sedation may be used in selected cases. Your anaesthesia team will explain the plan beforehand.

Can I drive myself home?

No. Arrange for someone else to take you home. Do not drive for at least 24 hours after general anaesthesia or deep sedation, or longer if your facility instructs you.

How painful is it?

You should not feel the procedure under general anaesthesia. Mild burning, bladder irritation, blood in the urine, or an ache in the side can occur afterward. A stent may cause additional discomfort.

When will I know the result?

The urologist may discuss the visual findings on the day. The laboratory result usually takes several days and may take up to one or two weeks.

Will I need a stent?

Not always. A stent may be placed if the ureter is narrow, swollen, injured, or needs help draining. Your team should tell you how and when it will be removed.

Sources

- American Urological Association and Society of Urologic Oncology. Diagnosis and Management of Non-Metastatic Upper Tract Urothelial Carcinoma: AUA/SUO Guideline . 2023.
- European Association of Urology. EAU Guidelines on Upper Urinary Tract Urothelial Cell Carcinoma .
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