



Agency for Healthcare Research and Quality
Advancing Excellence in Health Care • www.ahrq.gov

Imaging Tests To Check for Kidney Stones in the Emergency Department

You have come to the emergency department and the emergency doctor has recommended an imaging test to check for kidney stones. This summary will tell you about two types of imaging tests—a **CT scan (computed tomography scan)** and an **ultrasound**.

Kidney Stones and Possible Symptoms

The kidneys are bean-shaped organs that filter the waste chemicals out of your blood and make urine. A kidney stone is a hard piece of material that forms inside your kidney when tiny mineral crystals in your urine stick together.



Kidney stones can range in size and shape. They can be as small as a grain of sand or as large as a golf ball. But, big stones are rare.

Symptoms of kidney stones may include:

- » Sharp pain in your back, side, lower belly (below your belly button), or groin that may come and go
- » Nausea and vomiting
- » Blood in your urine
- » The feeling of sand or small particles passing through when you urinate
- » Pain when you urinate
- » Feeling like you need to urinate but cannot

Checking for Kidney Stones in the Emergency Department

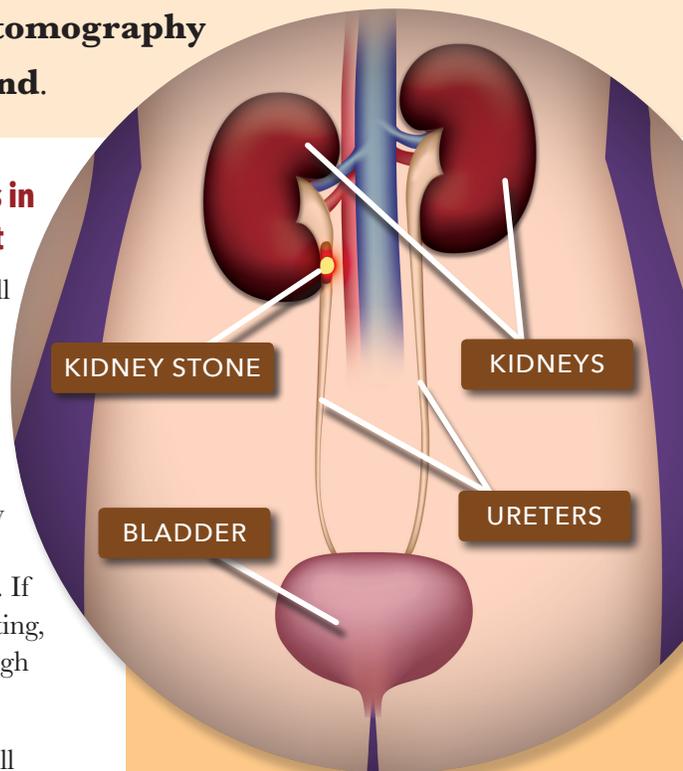
First, the emergency doctor will give you medicine to help stop your pain. The medicine may be given by mouth. Or, it may be given through an intravenous (IV) needle placed in a vein in your arm. You may also be given medicine to help stop your nausea and vomiting. If you are dehydrated from vomiting, you may be given liquids through an IV tube.

Next, the emergency doctor will talk with you about your symptoms and medical history. If the emergency doctor thinks you might have a kidney stone, several tests may be done. These may include:

URINE TESTS: To check for blood or mineral crystals in your urine or for signs of infection.

BLOOD TESTS: To check the health of your kidneys and for signs of a kidney or blood infection.

IMAGING TESTS: To check for kidney stones in your urinary tract (kidneys, ureters, and bladder). Imaging tests may include a CT scan or an ultrasound.



TALKING WITH THE EMERGENCY DOCTOR ABOUT YOUR OPTIONS FOR IMAGING TESTS

Talk with the emergency doctor about whether it might be better to have an ultrasound or a CT scan first to check for kidney stones.



You may want to think about:

How you feel about being exposed to radiation with a CT scan.

How you feel about possibly needing a second imaging test.

Imaging Tests To Check for Kidney Stones

Two imaging tests to check for kidney stones are a CT scan and an ultrasound. If the first imaging test is not clear, you may need a second test.

In the past, a CT scan was often used as the first imaging test to check for kidney stones. But, because a CT scan exposes people to radiation, the emergency doctor may suggest an ultrasound instead as the first imaging test.

	CT Scan	Ultrasound
What is it?	A CT scan uses x-rays and computers to create three-dimensional pictures of your urinary tract (kidneys, ureters, and bladder).	An ultrasound uses sound waves to create a picture of your kidneys and bladder. It is like the ultrasound used to look at the baby in the womb of a pregnant woman.
How is it done?	You lie still on a table that slides into a tunnel-shaped machine. A CT scan does not hurt.	You lie on your back or side, and a health care professional moves a small device around on your belly. An ultrasound does not hurt.
Does it expose you to radiation?	Yes, a CT scan exposes you to radiation. Radiation raises the risk of getting cancer.	No, an ultrasound does not expose you to radiation.

What Researchers Found

- » Both CT and ultrasound find most kidney stones.
- » Whether you have an ultrasound or a CT scan first:
 - Does not affect the amount of pain you have or how quickly your pain will go away.
 - Does not change the risk of having serious side effects or complications from kidney stones.
 - Does not change the risk of having to go back to the emergency department or stay in the hospital.
- » Having an ultrasound first may help you avoid being exposed to radiation from a CT scan.
 - If you have an ultrasound first, you may need a second imaging test, which may be a CT scan. But, most people who have an ultrasound first do not need a CT scan.

Note: If you and the emergency doctor decide on a CT scan, ask if it is possible to get a low-dose CT scan. Low-dose CT works as well as normal-dose CT to check for kidney stones and exposes you to less radiation.

The Source of This Information

The information in this summary comes from the research article, "Ultrasonography Versus Computed Tomography for Suspected Nephrolithiasis," published in *The New England Journal of Medicine*, September 18, 2014. The research was done by Rebecca Smith-Bindman and her colleagues through funding by the Agency for Healthcare Research and Quality. For more information, go to www.effectivehealthcare.ahrq.gov/kidney-stones-tests.

Additional information came from:

- » The MedlinePlus® Web site, available at www.medlineplus.gov.
- » The review article, "Managing Urolithiasis," by Ralph C. Wang. Published in the *Annals of Emergency Medicine*, November 23, 2015.

This summary was prepared by the John M. Eisenberg Center for Clinical Decisions and Communications Science at Baylor College of Medicine, Houston, TX.

Next Steps If a Kidney Stone Is Found

If a kidney stone is small enough, it can move or "pass" through your urinary tract and out of your body on its own. If the stone cannot pass on its own, you may need treatment.

Large stones can get stuck in either a kidney or a ureter. A stone that becomes stuck may cause pain that does not go away and may damage the kidney if it is not treated.

If the emergency doctor thinks the kidney stone will pass on its own without any problems:

- » You will probably be able to go home.
- » You may be given medicines for pain and nausea to take home.
- » You may be asked to drink water to help the kidney stone pass.
- » You will be asked to watch for the kidney stone when you urinate. You may be told how to strain your urine to catch a stone that passes. If the stone does not pass, call your health care professional.

If the emergency doctor thinks the kidney stone will not pass on its own or may cause problems:

- » You may need to stay in the hospital for treatment.
- » You may need to see a specialist and may need surgery to remove the stone.

If your nausea and vomiting do not stop:

- » You may need to stay in the hospital.

CAN KIDNEY STONES COME BACK?

After the kidney stone has passed or after it is removed, another stone may form. People who have had a kidney stone in the past are more likely to get another stone in the future.

If you have had a kidney stone, talk with your health care professional about your risk of getting another one. Ask your health care professional what steps you can take to lower your risk of getting another kidney stone.