

Computed Tomography (CT) & CT Angiography

Overview

A computed tomography (CT) scan is a noninvasive diagnostic test that uses x-rays and a computer to create images of the body. It allows your doctor to view your spine or brain in slices, as if it were sliced layer-by-layer and a picture taken of each slice. This test can help diagnose tumors, hemorrhages, head injuries, and bone abnormalities.

How does a CT scan work?

A CT scan works similar to an x-ray. The body casts a "shadow" on film when it is exposed to the x-ray, much like when you hold a flashlight up to your hand and cast a shadow on a wall. All of the tissue that the x-ray passes through overlap on the image, making it hard to isolate different elements. A CT scan works around this limitation by capturing one narrow slice of your body at a time. Inside the CT machine, the x-ray tube circles around the patient taking pictures as it rotates. These slices can be viewed two-dimensionally or added back together to create a three-dimensional image of a body structure.

A dye (contrast agent) may be injected into your bloodstream to enhance certain body tissues. The dye contains iodine, a substance that x-rays cannot pass through. It circulates through the blood stream and is absorbed in certain tissues, which then stand out on the scan.

CT angiogram (CTA) can be used to view arteries and veins. Contrast dye injected into the bloodstream helps the computer "see" the vessels. CTA images can be 3-D reconstructed so that the cerebral vessels and accompanying pathology can be rotated and viewed from all angles.

What does a CT scan show?

CT scans are very good at showing bone, soft tissue, and blood vessels (Fig. 1). While an MRI takes excellent pictures of soft tissue and blood vessels, a CT scan shows bone much better, so it's often used to image the spine and skull. It's also used to view the inner ear and sinuses because these areas are made of very fine bones.

Other detailed cross sections can be taken of the brain, vessels of the brain, neck, shoulders, spine, discs, spinal cord, and vessels of the spine.

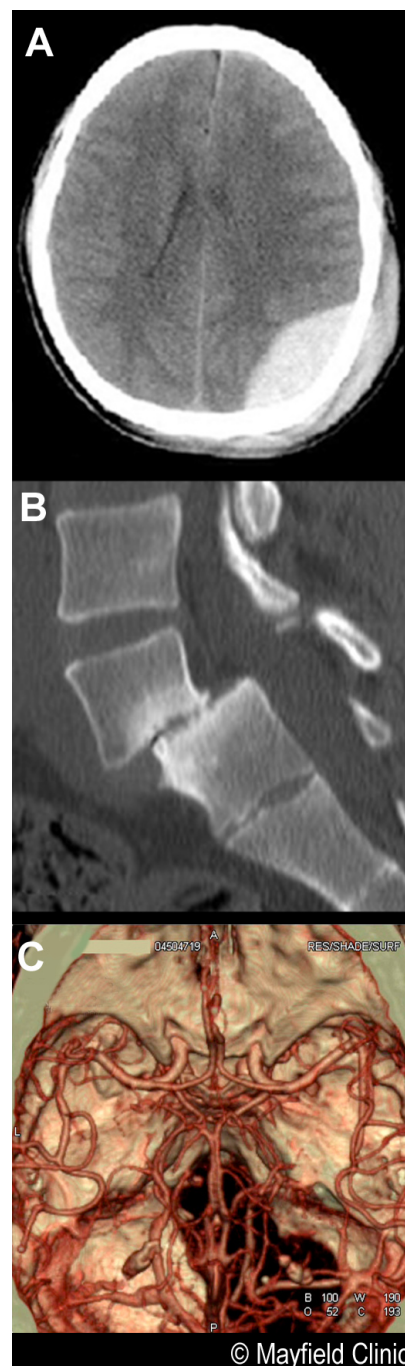


Figure 1. A, CT scan of the head showing a hematoma caused by an injury to the back of the skull during a car accident. B, CT scan of the spine showing slippage of the vertebra out of alignment (spondylolisthesis). C, CT angiogram of the blood vessels in the brain.

A CT scan can help your doctor diagnose many conditions including:

- brain damage after a head injury
- brain tumors
- ruptured or leaking aneurysms
- hydrocephalus, or enlarged brain cavities
- spinal stenosis, or narrowing of the spinal canal
- herniated discs
- blood clots or bleeding associated with stroke

Who performs the test?

A radiology technologist will perform the test in the CT suite of the Radiology department of the hospital or outpatient imaging center.

How should I prepare for the test?

You should wear loose clothing and remove all objects that would get in the way of the scan, such as hairpins. You may need to change into a hospital gown, depending on what part of your body is being imaged. Be sure to tell your doctor if you've ever had an allergic reaction to iodine contrast.

What happens during the test?

You will lie on a moveable table. If your head is being imaged, the technologist may position your head in a special head-holder that keeps it from moving. When you are comfortably positioned, the table will slowly move into the CT machine that looks like a large square doughnut with a hole in the middle (Fig. 2). The technologist will stay in constant contact with you over an intercom. While each picture is taken, you will be asked to hold your breath and stay perfectly still for a few seconds. The technologist will move the table with a remote control after each picture is taken. You may be given an injection of contrast dye into your arm or through an IV to enhance the images.

The machine may be quiet or noisy, depending on the brand. The noise you hear is the x-ray tube rotating around your body to produce the images. You will not feel any sensation from the scan. The scan can last from 5 to 15 minutes. After the test, the IV will be removed and you are free to go. You may be told to drink lots of fluids to help your kidneys remove the contrast dye from your body.

What are the risks?

There is a slight risk from X-ray radiation exposure, and some people are sensitive to the contrast agent. The most common side effects from the contrast are a brief metallic taste in your mouth and a feeling of warmth throughout your body. An



Figure 2. The CT table slides into the donut-shaped gantry where the x-ray tube rotates taking pictures of your body in slices.

allergic reaction to the contrast can cause severe hives and difficulty breathing. Medications such as antihistamines can reverse this reaction. If you have diabetes or kidney problems you may experience kidney failure, but this is very rare.

Be sure to tell your doctor if you are pregnant or have allergies (to medications, previous iodine injections, or shellfish), diabetes, asthma, a heart condition, kidney problems, or thyroid conditions.

How do I get the test results?

The radiologist will promptly review your images and communicate directly with your referring doctor, who in turn will discuss the results with you.

Sources & links

If you have more questions, please contact New England Neurological Associates at 978-687-2321.

Links

www.radiologyinfo.org

Glossary

contrast agent: a liquid (usually iodine or gadolinium) that is injected into your body to make certain tissues show up clearly during diagnostic imaging.

radiologist: a doctor who specializes in reading X-rays and other diagnostic scans.

X-ray: electromagnetic radiation used in diagnostic imaging to view shadows of tissue density in the body, also called roentgenogram.



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