Catheter Angiography



Catheter angiography uses a catheter, x-ray imaging guidance and an injection of contrast material to examine blood vessels in key areas of the body for abnormalities such as aneurysms and disease such as atherosclerosis (plaque). The use of a catheter makes it possible to combine diagnosis and treatment in a single procedure. Catheter angiography produces very detailed, clear and accurate pictures of the blood vessels and helps define treatment options.

Tell your doctor if there's a possibility you are pregnant and discuss any recent illnesses, medical conditions, medications you're taking and allergies, especially to iodinated contrast materials. If you're breastfeeding, ask your doctor how to proceed. If you are to be sedated, you may be told not to eat or drink anything for four to eight hours before your procedure. If so, you should plan to have someone drive you home. Ask your doctor if you will be admitted to the hospital overnight. Leave jewelry at home and wear loose, comfortable clothing. You will be asked to wear a gown.

What is Catheter Angiography?

Doctors use angiography to diagnose and treat blood vessel diseases and conditions. Angiography exams produce pictures of major blood vessels throughout the body. Some exams use contrast material (http://www.radiologyinfo.org) .

Doctors perform angiography using:

- x-rays with catheters
- computed tomography (CT)
- magnetic resonance imaging (MRI)

In catheter angiography, a thin plastic tube, called a catheter (http://www.radiologyinfo.org) , is inserted into a blood vessel through a small incision in the skin. Once the catheter is guided to the area being examined, the technologist injects a contrast material through the catheter and captures images using a small dose of ionizing radiation (x-rays (http://www.radiologyinfo.org)).

What are some common uses of the procedure?

Catheter angiography is used to examine blood vessels in key areas of the body, including the:

- brain
- neck
- heart
- chest
- abdomen (such as the kidneys and liver)
- pelvis

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- legs and feet
- arms and hands

Physicians use the procedure to:

- identify abnormalities, such as aneurysms, (http://www.radiologyinfo.org) in the aorta, both in the chest and abdomen, or in other arteries.
- detect atherosclerotic (http://www.radiologyinfo.org) (plaque) disease in the carotid artery of the neck, which may limit blood flow to the brain and cause a stroke.
- identify a arteriovenous malformation (http://www.radiologyinfo.org) inside the brain or elsewhere.
- detect plaque disease that has narrowed the arteries to the legs and help prepare for angioplasty/stent placement or surgery.
- detect disease in the arteries to the kidneys or visualize blood flow to help prepare for a kidney transplant or stent placement.
- guide interventional radiologists and surgeons making repairs to diseased blood vessels, such as implanting stents (http://www.radiologyinfo.org) or evaluating a stent after implantation.
- detect injury to one or more arteries in the neck, chest, abdomen, pelvis, or limbs following trauma.
- evaluate arteries feeding a tumor prior to surgery or other procedures such as chemoembolization or selective internal radiation therapy.
- identify dissection (http://www.radiologyinfo.org) or splitting in the aorta in the chest or abdomen or its major branches.
- show the extent and severity of coronary artery disease and its effects and plan for an intervention, such as a coronary bypass (http://www.radiologyinfo.org) and stenting.
- examine pulmonary arteries in the lungs to detect pulmonary embolism (https://www.radiologyinfo.org/en/info/pulmonary-embolism) (blood clots, such as those traveling from leg veins) or pulmonary AVMs.
- look at congenital abnormalities in blood vessels, especially arteries in children (e.g., malformations in the heart or other blood vessels due to congenital heart disease).
- evaluate stenosis (http://www.radiologyinfo.org) and obstructions of vessels.

How should I prepare?

Tell your doctor about all the medications you take. List any allergies, especially to iodine contrast materials (http://www.radiologyinfo.org) . Tell your doctor about recent illnesses or other medical conditions.

You may need to remove some clothing and/or change into a gown for the exam. Remove jewelry, removable dental appliances, eyeglasses, and any metal objects or clothing that might interfere with the x-ray images.

Women should always tell their doctor and technologist (http://www.radiologyinfo.org) if they are pregnant. Doctors will not perform many tests during pregnancy to avoid exposing the fetus (http://www.radiologyinfo.org) to radiation. If an x-ray is necessary, the doctor will take precautions to minimize radiation exposure to the baby. *See the Radiation Safety (https://www.radiologyinfo.org/en/info/safety-radiation) page for more information about pregnancy and x-rays.*

If you are breastfeeding at the time of the exam, ask your doctor how to proceed. It may help to pump breast milk ahead of time. Keep it on hand for use until all contrast material has cleared from your body (about 24 hours after the test). However, the most recent American College of Radiology (ACR) Manual on Contrast Media reports that studies show the amount of contrast absorbed by the infant during breastfeeding is extremely low. *For further information please consult the ACR Manual on Contrast Media (https://www.acr.org/Clinical-Resources/Contrast-Manual) and its references.*

If you are going to be given a sedative (http://www.radiologyinfo.org) during the procedure, you may be asked not to eat or drink anything for four to eight hours before your exam. Be sure that you have clear instructions from your health care facility.

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If you are sedated, you should not drive for 24 hours after your exam and you should arrange for someone to drive you home. Because an observation period is necessary following the exam, you may be admitted to the hospital for an overnight stay if you live more than an hour away.

What does the equipment look like?

This exam typically uses a radiographic table, one or two x-ray tubes, and a video monitor. Fluoroscopy converts x-rays into video images. Doctors use it to watch and guide procedures. The x-ray machine and a detector suspended over the exam table produce the video.

The catheter used in angiography is a long plastic tube about as thick as a strand of spaghetti.

How does the procedure work?

Catheter angiography works much the same as a regular x-ray exam.

X-rays are a form of radiation like light or radio waves. X-rays pass through most objects, including the body. The technologist carefully aims the x-ray beam at the area of interest. The machine produces a small burst of radiation that passes through your body. The radiation records an image on photographic film or a special detector.

Different parts of the body absorb the x-rays in varying degrees. Dense bone absorbs much of the radiation while soft tissue (muscle, fat, and organs) allow more of the x-rays to pass through them. As a result, bones appear white on the x-ray, soft tissue shows up in shades of gray, and air appears black.

When a contrast material (http://www.radiologyinfo.org) is introduced to the bloodstream during the procedure, it clearly defines the blood vessels being examined.

How is the procedure performed?

Your doctor will likely do this exam on an outpatient basis.

A nurse or technologist (http://www.radiologyinfo.org) will insert an intravenous (IV) (http://www.radiologyinfo.org) line into a small vein in your hand or arm.

A small amount of blood will be drawn before starting the procedure to make sure that your kidneys are working and that your blood will clot (http://www.radiologyinfo.org) normally. A small dose of sedative may be given through the IV line to lessen your anxiety during the procedure.

The area of the groin or arm where the catheter will be inserted is shaved, cleaned, and numbed with local anesthetic. The doctor will make a small incision (usually a few millimeters) in the skin where the catheter can be inserted into an artery or a vein. The catheter is then guided through the blood vessels to the area to be examined. After the contrast material is injected through the catheter and reaches the blood vessels being studied, several sets of x-rays are taken. Then the catheter is removed, and the incision site is closed by applying pressure on the area for approximately 10 to 20 minutes (or by using a special closure device).

When the examination is complete, the technologist may ask you to wait until the radiologist confirms they have all the necessary images.

Your intravenous line will be removed.

A catheter angiogram may be performed in less than an hour; however, it may last several hours.

What will I experience during and after the procedure?

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Prior to beginning the procedure, you will be asked to empty your bladder.

You will feel a slight pin prick when the needle is inserted into your vein for the intravenous line (IV).

Injecting a local anesthetic at the site where the catheter is inserted may sting briefly, but it will make the rest of the procedure pain-free.

You will not feel the catheter in your blood vessel, but when the contrast material is injected, you may have a feeling of warmth or a slight burning sensation. The most difficult part of the procedure may be lying flat for several hours. During this time, you should inform the nurse if you notice any bleeding, swelling or pain at the site where the catheter entered the skin.

You may resume your normal diet immediately after the exam. You will be able to resume all other normal activities 8 to 12 hours after the exam.

Who interprets the results and how will I get them?

A radiologist (https://www.radiologyinfo.org/en/info/article-your-radiologist) , a doctor trained to supervise and interpret radiology examinations, will analyze the images. The radiologist will send a signed report to your primary care or referring physician (http://www.radiologyinfo.org) who will discuss the results (https://www.radiologyinfo.org/en/info/all-about-your-radiology-report) with you.

What are the benefits vs. risks?

Benefits

- Angiography may eliminate the need for surgery. If surgery remains necessary, it can be performed more accurately.
- Catheter angiography presents a very detailed, clear and accurate picture of the blood vessels. This is especially helpful when a surgical procedure or some percutaneous (http://www.radiologyinfo.org) intervention is being considered.
- By selecting the blood vessels through which the catheter passes, it is possible to assess vessels in several specific body sites. In fact, a smaller catheter may be passed through the larger one into a branch artery supplying a small area of tissue or a tumor; this is called super-selective angiography.
- Unlike computed tomography (CT) (http://www.radiologyinfo.org) or magnetic resonance (MR) angiography (http://www.radiologyinfo.org) , use of a catheter makes it possible to combine diagnosis and treatment in a single procedure. An example is finding an area of severe arterial narrowing, followed by angioplasty (http://www.radiologyinfo.org) and placement of a stent (http://www.radiologyinfo.org) .
- The degree of detail displayed by catheter angiography may not be available with any other noninvasive (http://www.radiologyinfo.org) procedures.
- No radiation stays in your body after an x-ray exam.
- X-rays usually have no side effects in the typical diagnostic range for this exam.

Risks

- There is always a slight chance of cancer from excessive exposure to radiation. However, given the small amount of radiation used in medical imaging, the benefit of an accurate diagnosis far outweighs the associated risk.
- If you have a history of allergy to x-ray contrast material, your radiologist may advise that you take special medication for 24 hours before catheter angiography to lessen the risk of allergic reaction. Another option is to undergo a different exam that does not call for contrast material injection.
- Women should always tell their doctor and x-ray technologist if they are pregnant. *See the Radiation Safety (https://www.radiologyinfo.org/en/info/safety-radiation) page for more information about pregnancy and x-rays.*
- IV contrast manufacturers indicate mothers should not breastfeed their babies for 24-48 hours after contrast material is

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given. However, the most recent American College of Radiology (ACR) Manual on Contrast Media reports that studies show the amount of contrast absorbed by the infant during breastfeeding is extremely low. *For further information please consult the ACR Manual on Contrast Media (https://www.acr.org/Clinical-Resources/Contrast-Manual) and its references.*

- The risk of serious allergic reaction to contrast materials that contain iodine is extremely rare, and radiology departments are well-equipped to deal with them.
- There is a small risk that blood will form a clot around the tip of the catheter, blocking the artery and making it necessary to operate to reopen the vessel.
- If you have diabetes or kidney disease, the kidneys may be injured due to the contrast material. In most cases, the kidneys will regain their normal function within five to seven days.
- Rarely, the catheter punctures the artery, causing internal bleeding. It also is possible that the catheter tip will separate material from the inner lining of the artery, causing a block downstream in the blood vessel.

What are the limitations of Catheter Angiography?

Patients with impaired kidney function, especially those who also have diabetes, are at a higher risk of complications. Your doctor will advise you if the benefits of angiography outweigh the risks.

Patients who have previously had allergic reactions to x-ray contrast materials are at risk of having a reaction to contrast materials that contain iodine. If angiography is essential, a variety of methods is used to decrease risk of allergy:

- You may be given one or more doses of a steroid medication ahead of time.
- Contrast material without iodine may be used instead of standard x-ray contrast.

Catheter angiography should be done very cautiously—if at all—in patients who have a tendency to bleed.

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