TEST

Left heart ventricular angiography

Left heart ventricular angiography uses contrast dye and live X-rays to assess how the heart's main pumping chamber works.

WHAT IT MEASURES
Left ventricle pumping, shape, wall movement, and valve leakage

SAMPLE
None; live X-ray imaging after iodinated contrast injection

FASTING NEEDED?
Sometimes, usually several hours before sedation

HOW LONG IT TAKES
Several hours, including preparation, procedure, and recovery

RESULTS IN
Usually same day; report timing varies by hospital

USED FOR
Diagnosis and treatment planning

MAIN LIMITATION
A two-dimensional snapshot affected by heart rhythm and loading conditions

Overview

Left heart ventricular angiography is an invasive imaging test. It shows the left ventricle, the heart chamber that pumps oxygen-rich blood to the body.

During the test, a thin tube called a catheter is passed through an artery to the heart. Iodinated contrast dye is injected into the left ventricle while a moving X-ray, called fluoroscopy, records how the chamber fills and contracts.

The test may show:

It is often performed as part of left heart catheterization. It may be done during the same procedure as coronary angiography, which looks for narrowing in the arteries supplying the heart. These are related but separate tests.

Because ventricular angiography requires an arterial catheter, radiation, and contrast dye, an echocardiogram or cardiac MRI may be preferred when they can answer the same question without an invasive procedure.

- How strongly the left ventricle pumps
- Whether its walls move normally
- The chamber's size and shape
- Leakage through the mitral valve
- Certain structural abnormalities

Why the test is ordered

Your healthcare team may order ventricular angiography when direct information about left ventricular function could affect diagnosis or treatment.

Possible reasons include:

It is not normally used as a general screening test. It also does not replace coronary angiography when the main question concerns blocked coronary arteries.

- Assessing pumping function when other imaging is unclear
- Examining abnormal movement of the heart muscle
- Looking for complications after a heart attack
- Assessing possible mitral valve leakage
- Investigating an unusual left ventricular shape or bulge
- Collecting information during another cardiac catheterization procedure

Who should have the test

The test may be appropriate if you are already having cardiac catheterization and the additional images are expected to provide useful information. It may also be considered when an echocardiogram has not clearly shown the left ventricle or when pressure measurements inside the heart are needed.

The decision is individual. Your team will consider whether another test, such as echocardiography or cardiac MRI, could provide the needed information with less risk.

Extra planning may be needed if you have reduced kidney function, a previous reaction to iodinated contrast, a bleeding condition, or a possible pregnancy. These factors do not always prevent the test, but they can change how it is performed.

How to prepare

Follow the instructions from the catheterization unit. Some hospitals ask you not to eat or drink for several hours, particularly if sedation is planned. Other procedures allow clear fluids until a specified time.

Tell the team about:

Do not stop medicines unless the team performing the procedure tells you to. Medicine instructions differ according to the drug, your kidney function, and why you take it.

Blood tests may be used to check kidney function, blood count, and clotting. Arrange transport home if you will receive sedation, because you should not drive afterward.

A shellfish allergy does not specifically mean that you are allergic to iodinated contrast. A previous reaction to contrast itself is more relevant and should be reported.

- All prescription, over-the-counter, and complementary medicines
- Blood thinners and medicines for diabetes
- Previous reactions to X-ray contrast
- Kidney disease, bleeding problems, or heart rhythm conditions
- Any possibility that you are pregnant

What happens during the test

You will usually be awake but may receive medicine to help you relax. Monitoring equipment records your heart rhythm, blood pressure, and oxygen level.

The skin at the wrist or groin is cleaned and numbed with local anesthetic. A small tube is placed into an artery. The cardiologist guides a catheter through the artery, across the aortic valve, and into the left ventricle using live X-ray images.

Pressure may be measured inside the chamber. Contrast is then injected through the catheter while the X-ray system records the ventricle from one or more angles. You may briefly feel warmth, flushing, or an urge to cough. You may be asked to hold your breath for a few seconds.

The catheter is removed after the images and other planned measurements are complete. Pressure, a compression device, or a closure device is used at the artery entry site.

The procedure itself may be relatively brief, but preparation and recovery usually make the appointment several hours long.

Understanding your results

The report describes the left ventricle's size, shape, pumping function, and wall movement.

Pumping may be reported as the ejection fraction. This is the proportion of blood pushed out of the ventricle with each contraction. It does not measure all aspects of heart function, and the number should be interpreted alongside your symptoms, examination, and other tests.

Wall movement may be described as normal, reduced, absent, or moving in the opposite direction from expected. The report may also grade contrast flowing backward through the mitral valve, which can suggest valve leakage.

There is no single universal normal result for every measurement. Ranges and interpretation can vary by laboratory or imaging facility, equipment, age, sex, pregnancy status, medicines, and clinical context. The method used to calculate chamber volume and ejection fraction also matters.

What affects the results

Ventricular angiography records a short period in time. Several factors can change what the images show without representing a lasting change in your heart.

An irregular or early heartbeat during the contrast injection can alter how forcefully the next beat contracts. Catheter contact and rapid contrast injection can sometimes trigger these extra beats.

Blood pressure and the amount of blood returning to the heart also affect chamber size, pumping measurements, and apparent valve leakage. Sedatives, intravenous fluids, nitrates, and other medicines given during catheterization may change these conditions.

Image quality may be affected by:

Recent strenuous exercise or caffeine may temporarily change heart rate or blood pressure, but they are not usually major sources of error. Kidney function does not directly change the image measurement, although it affects the safety and amount of contrast that may be used.

- Movement or difficulty holding your breath
- Incomplete filling of the ventricle with contrast
- Catheter position
- Overlapping heart structures
- Using one viewing angle rather than several

- Assumptions made when converting a two-dimensional image into chamber volumes

Accuracy and limitations

Ventricular angiography can provide useful direct images of contraction during catheterization. However, there is no single figure for how often it is right or wrong because it measures several findings and techniques differ.

Poor contrast filling or a limited viewing angle can miss a regional wall-motion problem. Conversely, an extra heartbeat, unusual projection, or temporary change in blood pressure can make movement or valve leakage look more abnormal than it usually is.

Calculated ejection fraction can differ from measurements obtained by echocardiography, cardiac MRI, or nuclear imaging. This does not automatically mean that one result is incorrect. Each method uses different images and assumptions.

Echocardiography is often better for repeated assessment because it does not require an artery puncture, contrast, or radiation. Cardiac MRI may provide more reproducible chamber volumes and can examine heart muscle tissue. Echocardiography is generally more suitable for detailed assessment of mitral valve structure and blood flow.

Ventricular angiography does not by itself show whether the coronary arteries are narrowed. Separate coronary angiography is needed for that information.

Risks and complications

Minor bruising, tenderness, or a small lump at the wrist or groin is common after an arterial catheter. Some people feel faint during needle or catheter procedures.

Other possible risks include bleeding, artery damage, an abnormal heart rhythm, an allergic-like contrast reaction, and a temporary decline in kidney function. Radiation exposure is limited as much as practical.

More serious complications, such as stroke, heart attack, major bleeding, heart perforation, or death, are uncommon but possible. Your personal risk is influenced by your health, kidney function, reason for catheterization, and whether other procedures are performed at the same time.

What happens next

You will be monitored while the artery entry site seals. Staff may ask you to keep your wrist or leg still for a period. Follow the discharge instructions about activity, bathing, medicines, and fluid intake.

A small bruise or mild tenderness can usually be discussed at routine follow-up. Contact the catheterization team promptly if the site becomes increasingly painful, swollen, red, warm, or begins draining, or if you develop a fever.

Seek emergency help for:

Your clinician will review the findings with your other test results. The next step may be observation, medicine changes, another imaging test, or treatment for an identified heart or artery problem.

- Bleeding that does not stop with firm pressure
- Rapidly expanding swelling at the catheter site
- New chest pain, severe breathlessness, or fainting
- A cold, pale, painful, weak, or numb arm or leg
- Sudden trouble speaking, facial drooping, or one-sided weakness

Common questions

Can I drink coffee before the test?

Not unless your instructions allow it. Coffee may break the required fasting period, and caffeine can raise heart rate or blood pressure. Follow the specific cut-off time provided by the catheterization unit.

Does the time of day matter?

The images are not usually affected greatly by the time of day. Scheduling matters more for fasting, medicine timing, and recovery arrangements.

Can I exercise beforehand?

Avoid strenuous exercise on the day unless the team says otherwise. It can temporarily change heart rate, blood pressure, and fluid balance.

Will it hurt?

The local anesthetic can sting briefly. You may feel pressure at the catheter site and warmth when contrast is injected, but the catheter moving inside the blood vessels is not usually painful. Tell the team immediately about chest pain or other significant discomfort.

Can I drive home afterward?

Usually not if you received sedation. Even without sedation, artery-site restrictions may affect safe driving. Arrange for someone to take you home unless the catheterization unit clearly tells you otherwise.

What if I have kidney disease or had a contrast reaction?

Tell the team before the procedure. They may review kidney blood tests, adjust the contrast plan, or use medicines and monitoring appropriate to your previous reaction. Do not assume the test must be cancelled.

Sources

- MedlinePlus Medical Encyclopedia: Heart ventriculography
- American Heart Association: Cardiac catheterization
- American College of Radiology: Manual on Contrast Media
- Naidu SS, Abbott JD, Bagai J, et al. SCAI expert consensus update on best practices in the cardiac catheterization laboratory. Catheterization and Cardiovascular Interventions. 2021;98(2):255-276
- Merck Manual Consumer Version: Cardiac catheterization and coronary angiography