TEST

Right heart ventricular angiography

An invasive X-ray test that shows the right ventricle as contrast flows through it.

WHAT IT MEASURES
Right ventricle shape, pumping, and blood flow on contrast X-rays

SAMPLE
None; live X-ray imaging with injected contrast

FASTING NEEDED?
Sometimes, usually when sedation is planned

HOW LONG IT TAKES
About 30 to 60 minutes, longer with other procedures

RESULTS IN
Same day to several days; varies by laboratory and facility

USED FOR
Diagnosis and planning heart procedures

MAIN LIMITATION
Two-dimensional images can misrepresent the right ventricle's complex shape

Overview

Right heart ventricular angiography is an invasive imaging test. It uses a thin tube called a catheter, an iodine-based contrast liquid, and moving X-rays to show the right ventricle.

The right ventricle is the lower-right chamber of the heart. It pumps blood through the pulmonary artery to the lungs. During angiography, contrast is injected into this chamber so its shape and movement can be recorded.

The test is usually performed in a cardiac catheterization laboratory. It may be part of a longer procedure that also measures heart pressures or examines blood vessels and valves.

Echocardiography and cardiac magnetic resonance imaging, or MRI, can assess the right ventricle without placing a catheter in the heart. Because of this, right ventricular angiography is generally used for a specific question or during another planned catheter procedure.

Why the test is ordered

The test can provide information about:

It can sometimes help assess tricuspid regurgitation, where blood leaks backward through the valve between the right atrium and right ventricle. However, the force of the contrast injection or the catheter itself may exaggerate this leakage.

Angiography may also be performed before or during treatment for certain congenital heart conditions. These are differences in heart structure present from birth.

- The size and shape of the right ventricle
- How strongly different parts of the ventricle contract
- Blood flow through the right ventricular outflow tract
- Pulmonary or tricuspid valve problems
- Abnormal connections or structural heart conditions
- Anatomy needed to plan or guide a catheter-based procedure

Who should have the test

You may be offered right ventricular angiography when information from an echocardiogram, CT scan, or MRI is incomplete, or when direct imaging is needed during a catheter-based treatment.

It may be considered if you have a suspected structural problem involving the right ventricle, pulmonary valve, tricuspid valve, or nearby blood vessels. It can also be used after some heart operations or procedures to examine repaired anatomy.

This is not a routine screening test. Whether it is appropriate depends on the question being asked, the quality of previous imaging, and whether the result is likely to change your care.

How to prepare

Your hospital will give you instructions about eating and drinking. You may need to avoid food for several hours, particularly if sedation is planned. Clear-liquid instructions differ between facilities.

Tell the team about all prescription medicines, over-the-counter medicines, and supplements you take. This is especially important for blood thinners like warfarin or apixaban , diabetes medicines, diuretics like furosemide or hydrochlorothiazide , and medicines that affect blood pressure. Do not stop a medicine unless your care team tells you to.

Also tell them if you:

A seafood or shellfish allergy does not by itself mean that you are allergic to iodine-based contrast. A previous reaction to the same type of contrast is more relevant.

Blood tests may be used to check kidney function, blood count, or clotting. If you will receive sedation, arrange transport home and follow the facility's instructions about driving and staying with another adult.

- Have had a previous reaction to X-ray contrast
- Have kidney disease or reduced kidney function
- Have a bleeding disorder
- Are pregnant or could be pregnant
- Have recently been unwell or developed an infection

What happens during the test

You will usually change into a gown and lie on an X-ray table. Staff attach heart-monitoring stickers and check your blood pressure and oxygen level. An intravenous line may be placed for medicines or fluids.

The skin over the access site is cleaned and numbed with local anaesthetic. The catheter is usually inserted through a vein in the groin, neck, or arm. Using live X-ray guidance, the clinician moves it through the vein and into the right side of your heart.

Contrast is injected rapidly into the right ventricle while a series of X-ray images is recorded. You may briefly notice warmth, a flushed feeling, nausea, or an urge to cough. Tell the team immediately if you feel pain, severe breathlessness, itching, or throat tightness.

The catheter can occasionally irritate the heart and cause extra beats during positioning or injection. These often stop when the catheter is moved, but your heart rhythm is monitored throughout.

After imaging, the catheter is removed. Pressure or a closure method is used at the access site. You will then be monitored during recovery. The full appointment takes longer if angiography is combined with pressure measurements or another heart procedure.

Understanding your results

The report may describe the right ventricle's size, outline, wall movement, and overall pumping function. It may also comment on the outflow tract, valves, nearby vessels, or abnormal blood

flow.

A pumping measurement called the ejection fraction may be estimated. This is the proportion of blood pushed out with each heartbeat. Right ventricular measurements are harder to calculate than left ventricular measurements because the right ventricle has an irregular, curved shape.

There is no single result that can be interpreted on its own. Ranges and interpretation vary by imaging laboratory, technique, age, sex, pregnancy status, medicines, and clinical context. Results are usually compared with your symptoms, examination, pressure measurements, echocardiogram, MRI, or other imaging.

What affects the results

Several factors can make the images misleading even when the equipment is working properly.

A catheter touching the ventricular wall can trigger extra heartbeats. Images captured during or just after these beats may make contraction look weaker or less coordinated than it normally is.

The amount, speed, and timing of the contrast injection matter. Too little contrast or incomplete mixing with blood can leave parts of the chamber poorly outlined. A forceful injection may temporarily change blood flow or make valve leakage appear greater.

The right ventricle has a complex three-dimensional shape. A two-dimensional X-ray angle can shorten, overlap, or hide part of it. Breathing, coughing, or moving during the injection can also blur the outline.

Heart function changes with blood volume, blood pressure, breathing pressure, sedation, and medicines such as diuretics or blood-pressure drugs. These effects may produce a genuine temporary change rather than a measurement error.

Kidney function does not usually alter the image itself, but it can affect the amount and type of contrast considered safe. Pregnancy changes the decision about radiation exposure rather than automatically making the image inaccurate. Recent exercise, iron levels, and blood transfusions are not major direct sources of error for this test.

Accuracy and limitations

Right ventricular angiography can clearly show contrast passing through the chamber and may

provide useful anatomy during an invasive procedure. However, its accuracy depends on catheter position, image angle, contrast delivery, and whether the heart rhythm remains steady.

The test can miss small structural abnormalities or subtle wall-motion changes if the relevant area is hidden by overlap or poorly filled with contrast. It can also suggest a problem that is not truly present. For example, extra heartbeats may imitate weak contraction, while catheter position or forceful injection may exaggerate tricuspid valve leakage.

There is no single meaningful rate for how often this test misses disease or gives a false result. Accuracy differs according to the condition being investigated and the imaging method used for comparison.

Echocardiography is often better for viewing valves and blood flow without radiation or catheter insertion. Cardiac MRI is generally better for detailed three-dimensional measurement of right ventricular size and pumping function. CT may be preferred for certain vessels or anatomical structures. Angiography remains useful when direct imaging is needed during a catheter procedure.

Risks and complications

A small bruise, tenderness, or mild swelling at the catheter site is common. Some people feel faint during needle or catheter procedures.

Other possible risks include bleeding, infection, an abnormal heart rhythm, a reaction to contrast, and temporary worsening of kidney function. Radiation exposure is kept as low as reasonably possible. Rare but serious complications include damage to the heart or blood vessel, a blood clot, stroke, heart attack, fluid around the heart, or the need for urgent treatment.

After discharge, mild soreness and a small stable bruise can usually be followed using the care instructions you were given.

Contact the cardiac catheterization team promptly if the site becomes increasingly painful, red, warm, or swollen, or if you develop fever, drainage, persistent bleeding, or new numbness or coolness in the affected limb.

Seek emergency help for bleeding that does not stop with firm pressure, severe chest pain, major difficulty breathing, fainting, signs of a stroke, or swelling of the face or throat.

What happens next

A clinician may discuss an initial impression with you before you leave. The complete report may take longer, especially when images, pressure measurements, and earlier scans need to be compared.

A normal result may mean no further invasive testing is needed. An unclear result may lead to echocardiography, MRI, CT, or review by a specialist in structural or congenital heart conditions.

If the test finds an abnormality, the next step depends on its type and severity. Routine follow-up may include monitoring, medicines, or planned imaging. Some findings may lead to a scheduled catheter treatment or operation rather than emergency care.

Follow the instructions for wound care, activity, bathing, medicines, and driving. Drinking fluids may be advised after contrast, but this may not be appropriate if you have heart failure, kidney disease, or a fluid restriction.

Common questions

Can I drink coffee before the test?

Not if your instructions say to fast or avoid drinks other than clear liquids. Coffee with milk is not a clear liquid. Ask the catheterization unit if your written instructions are unclear.

Does the time of day matter?

The images are not normally affected by morning or afternoon testing. Appointment time may affect when you must stop eating and how medicines are scheduled.

Can I exercise beforehand?

Ordinary activity does not usually distort the test. Avoid strenuous exercise on the day unless your care team says it is safe, particularly if exercise causes chest pain, breathlessness, dizziness, or palpitations.

Will I be awake?

Most people are awake with local anaesthetic and may receive light sedation. Deeper sedation or general anaesthesia may be used for some procedures or clinical situations.

Is the contrast the same as MRI contrast?

No. X-ray angiography usually uses iodine-based contrast. MRI generally uses a different type of contrast, often containing gadolinium.

Can I drive home afterward?

You should not drive if you received sedation. Access-site restrictions or the reason for the

procedure may also affect driving, so follow the discharge instructions from the facility.

Sources

- American College of Radiology. ACR Manual on Contrast Media . 2024.
- Naidu SS, Abbott JD, Bagai J, and colleagues. "SCAI Expert Consensus Update on Best Practices in the Cardiac Catheterization Laboratory." Catheterization and Cardiovascular Interventions . 2021;98(2):255-276.
- Baumgartner H, De Backer J, Babu-Narayan SV, and colleagues. "2020 ESC Guidelines for the Management of Adult Congenital Heart Disease." European Heart Journal . 2021;42(6):563-645.
- U.S. Food and Drug Administration. Omnipaque (iohexol) Injection Prescribing Information .
- U.S. National Library of Medicine, MedlinePlus Medical Encyclopedia. "Heart Ventriculography."