TEST

Renal venogram

A renal venogram uses contrast dye and live X-rays to examine the veins carrying blood away from your kidneys.

WHAT IT MEASURES
Renal vein anatomy, blood flow, and pressure

SAMPLE
None; live X-ray imaging with contrast dye

FASTING NEEDED?
Sometimes, especially when sedation is planned

HOW LONG IT TAKES
About one to three hours, including early recovery

RESULTS IN
Same day to several days; varies by laboratory

USED FOR
Diagnosis and planning vein treatment

MAIN LIMITATION
Collateral veins can hide an important pressure difference

Overview

A renal venogram is an invasive imaging test of the renal veins. These veins carry blood away from your kidneys and into a large central vein called the inferior vena cava.

During the test, a specialist passes a thin, flexible tube called a catheter into a vein, usually through the groin or neck. Contrast dye is injected through the catheter. Live X-rays, called fluoroscopy, show how the dye moves through the renal veins.

The specialist may also measure pressure in different veins. This can help assess whether blood flow is being restricted or redirected through smaller alternative veins, known as collateral veins.

A renal venogram is not usually the first test for kidney or vein symptoms. Ultrasound, CT or MRI can often provide the initial information without placing a catheter into a blood vessel.

Why the test is ordered

A renal venogram may be ordered when other tests suggest a problem with blood flow through a renal vein but do not provide a clear answer.

It may help investigate:

One possible reason for the test is suspected nutcracker syndrome. This occurs when the left renal vein is compressed between nearby structures and the compression is linked to symptoms. A narrowed-looking vein on a scan does not by itself establish this diagnosis because similar anatomy can occur without causing a health problem.

Less commonly, blood may be collected from each renal vein during the procedure. This is called renal vein sampling. It can compare substances released into the blood by each kidney, such as the hormone renin, in selected investigations.

- Suspected narrowing or compression of a renal vein
- A possible blood clot or blockage
- Unusual collateral veins around a kidney
- Blood in the urine that may be linked to abnormal venous pressure
- Vein anatomy before a stent, operation or other procedure
- Whether a previous renal vein treatment remains open

Who should have the test

A renal venogram may be considered when non-invasive imaging suggests an important renal vein problem and the result could change treatment. It is also used when an interventional radiologist expects to perform treatment, such as placing a stent, during the same appointment.

It is not a routine screening test. Because it involves a catheter, radiation and contrast dye, the likely benefit should outweigh these risks.

Before recommending the procedure, your healthcare team will consider your symptoms, previous scans, kidney function, medicines and medical history. Pregnancy or possible pregnancy needs particular consideration because fluoroscopy uses X-rays.

How to prepare

Follow the instructions from the radiology department. Preparation differs according to whether sedation is planned and whether another procedure may be performed at the same

time.

You may be asked not to eat for several hours beforehand. Some centres allow clear liquids until closer to the appointment, while others use different rules. Follow the times in your appointment information rather than assuming that usual fasting advice applies.

Tell the team about:

Blood tests may be needed to check kidney function, blood counts and clotting. Do not stop a blood thinner like warfarin or apixaban , diabetes medicine or any other prescribed medicine unless the team arranging the procedure tells you to do so.

Arrange transport home if you will receive sedation. You may also need someone to stay with you afterward.

- Previous reactions to contrast dye
- Kidney disease, diabetes or dehydration
- Pregnancy or the possibility of pregnancy
- Bleeding disorders
- All prescription, over-the-counter and herbal medicines
- Blood thinners or medicines that affect platelets
- Problems with sedation or anaesthesia in the past

What happens during the test

You will usually change into a gown and lie on an X-ray table. A member of the team may place an intravenous line in your arm for fluids or medicine.

The skin over the access vein, commonly in the groin or neck, is cleaned and covered with sterile drapes. Local anaesthetic numbs the area. You may also receive medicine to help you relax, but general anaesthesia is not usually required for a diagnostic venogram.

The specialist makes a small skin opening and guides the catheter through your veins using live X-rays. You may feel pressure at the access site, but the catheter moving inside the vein is not usually painful.

Contrast is injected when the catheter reaches the renal vein. You may briefly feel warmth, flushing or a metallic taste. Images are taken as the contrast flows through the vein.

If pressure measurements are required, the catheter records pressure in the renal vein and nearby central vein. Blood samples may also be taken in selected cases. If treatment has been planned, it may follow immediately.

At the end, the catheter is removed and pressure is applied to the access site. You will be monitored during recovery and may need to lie flat for a period, especially after groin access.

Understanding your results

The report may describe the size and shape of each renal vein, where any narrowing occurs and how quickly contrast passes through it. It may also mention clots, delayed drainage, reversed flow or collateral veins.

If pressures were measured, the specialist may compare pressure in a renal vein with pressure in the inferior vena cava. A larger difference can support significant obstruction, but there is no single number that should be interpreted by itself. Pressure can be reduced when collateral veins have already developed and are allowing blood to bypass the narrowed area.

Your result is considered alongside your symptoms and other imaging. A visible narrowing without altered flow, a pressure difference or matching symptoms may not explain why the test was ordered.

Ranges and interpretation can vary by laboratory, measurement technique, age, sex, pregnancy status, medicines and clinical context.

What affects the results

A renal venogram is a snapshot of blood flow at one point in time. Several factors can change what the images or pressure readings show even when the equipment is working correctly.

Body position matters. Renal vein compression can look different when you are lying down compared with standing. Breathing, coughing or straining can temporarily change pressure in the abdomen and veins.

Hydration also affects venous pressure. Dehydration may reduce the volume of blood moving through the veins. Intravenous fluids given before or during the procedure can have the opposite effect.

Sedation, pain, anxiety and changes in blood pressure may alter pressure measurements. Vigorous exercise shortly before the appointment can temporarily affect hydration and circulation, although it is not usually a major source of error.

Collateral veins are an especially important limitation. They may divert blood around a compressed renal vein, making the measured pressure difference appear smaller than expected.

Catheter position and pressure-equipment calibration can influence readings. Previous surgery, a vein stent or altered anatomy may also change how the result is interpreted.

Kidney function does not usually create a false vein image, but it can affect how much contrast can safely be used. Pregnancy changes blood volume and abdominal anatomy and also affects whether an X-ray procedure is appropriate. A recent blood transfusion generally does not alter venogram images, although it may matter if renal vein blood sampling is planned.

Accuracy and limitations

Catheter venography gives detailed, real-time images and allows direct pressure measurements. It is often used when ultrasound, CT or MRI has not answered the clinical question.

However, it is not perfectly accurate. It can miss intermittent or position-dependent compression because you are usually lying down. It may also appear normal when collateral veins have lowered the pressure in the renal vein.

The test can suggest a problem when there is no clinically important obstruction. In particular, anatomical narrowing may be visible in people who do not have symptoms caused by it. The result therefore cannot be interpreted separately from your history and other tests.

Doppler ultrasound may be better for comparing blood-flow speed in different positions. CT or MRI may better show surrounding structures and the cause of external compression. Intravascular ultrasound, which places a tiny ultrasound probe inside the vein, may provide better measurements when planning a stent.

No reliable single percentage describes how often renal venography misses a problem or gives a misleading positive result across all uses. Accuracy changes with the condition being investigated, the technique and how the findings are interpreted.

Risks and complications

A small bruise, tenderness or mild bleeding can occur where the catheter entered the vein. Some people feel faint during needle or catheter procedures.

Less common complications include infection, damage to a blood vessel, a new blood clot or more significant bleeding. Contrast can cause an allergic-like reaction. It can also contribute to kidney injury, particularly when kidney function is already reduced or other risk factors are present.

Fluoroscopy exposes you to a limited amount of ionising radiation. The team aims to use the lowest amount needed. Sedation can cause drowsiness, nausea or changes in breathing and blood pressure, so you are monitored closely.

What happens next

After recovery, you may go home the same day. Follow the department's advice about activity, bathing, driving and restarting medicines.

A preliminary result may be available immediately. The final report may take longer if the images, pressure measurements or blood samples need further review.

Contact the procedure team promptly if the access site becomes increasingly painful, red or swollen, or if there is drainage, fever, reduced urine output or bleeding that returns after you leave.

Seek urgent or emergency help for bleeding that does not stop with firm pressure, a rapidly enlarging swelling, a cold or numb limb, fainting, severe chest pain, difficulty breathing, or swelling of the face or throat.

Follow-up may involve reviewing the result with the specialist who requested the test. The next step could be observation, another imaging test or discussion of treatment. An abnormal-looking venogram does not automatically mean that a procedure is needed.

Common questions

Can I drink coffee before a renal venogram?

Only if your preparation instructions allow it. If sedation is planned, coffee may be restricted even when it is black. Follow the fasting instructions from your radiology department.

Does the time of day matter?

Usually not. Hydration, body position and procedural conditions are more important than the clock time.

Can I exercise beforehand?

Light normal activity is generally unlikely to affect the test. Avoid unusually strenuous exercise if it could leave you dehydrated, and follow any specific instructions from the department.

Is a renal venogram painful?

The local anaesthetic may sting briefly, and you may feel pressure where the catheter enters.

Contrast can cause a short-lived warm feeling. Tell the team if you have pain during the procedure.

Can I drive home afterward?

Not if you received sedation. Even without sedation, the department may advise against driving because of the catheter access site. Arrange transport unless you have been clearly told that driving is safe.

Is contrast dye safe for my kidneys?

Most people receive iodinated contrast without kidney complications. Risk is higher in some people with impaired kidney function or acute illness, so kidney tests and hydration may be reviewed before the procedure.

Sources

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