

Angiography

Introduction

What an angiography can check

The heart is one of the most common areas of the body that can be checked using an angiography. A coronary angiography can check the flow of blood into the heart and help to diagnose heart disease.

Other areas of the body that can be examined using an angiography include the:

brain (cerebral angiography)

lungs (pulmonary angiography)

kidneys (renal angiography)

arms or legs (extremity angiography)

An angiography is a type of X-ray used to examine blood vessels. The images created during an angiography are called angiograms.

Blood vessels don't show up clearly on ordinary X-rays, so a special dye is injected into the area being examined. The dye highlights the blood vessels as it moves through them, and it appears white on the angiogram. The medical name for this type of angiography is cardiac catheterisation.

Less commonly, angiographies can also be carried out using magnetic resonance imaging (MRI) and computerised tomography (CT) techniques.

Why angiograms are used

An angiography can help diagnose conditions that affect blood vessels and the flow of blood through them. These include:

coronary heart disease – the blood flow through the artery that supplies the heart is disrupted because it has become narrowed

aneurysm – a section of a blood vessel wall bulges outwards due to a weakness in the wall

atherosclerosis – blood vessels become clogged up with fatty substances, such as cholesterol; an angiography can be used to assess the level of atherosclerosis in specific blood vessels

Problems caused by serious arterial disease include strokes, heart attacks, gangrene and organ failure, so it's important that problems with your circulation are investigated as soon as possible.

The images from coronary angiography are important to help plan treatment for angina and heart attacks. Treatment options include medication or surgery, such as a coronary angioplasty or a coronary artery bypass graft.

The angiography procedure

An angiography is carried out in hospital. It takes between 30 minutes and two hours, depending on the complexity of the investigation. You will usually be allowed to go home on the same day, although in some cases you may need to stay in hospital overnight.

In most cases, angiographies are planned procedures, performed under local anaesthetic, sometimes with sedation. However, general anaesthetic may be used for young children, or if the procedure is particularly complex.

A very thin, flexible tube called a catheter is inserted through a small cut and into one of your arteries, usually in your groin or your leg. A radiologist (a doctor who specialises in imaging studies) will guide the catheter into the area that needs to be examined. The dye (medically known as a contrast dye or contrast medium) is injected through the catheter and into the blood vessel. A series of X-rays is then taken.

Safety

An angiography is a generally safe and painless procedure. The risks of serious complications are low.

Sometimes, an angiography can cause minor bruising where the catheter is inserted. Also, some people may occasionally have an allergic reaction to the contrast dye. This is usually easily treated with medication.

Read more about the complications of an angiography

What angiography is used for

An angiogram is an imaging technique used to assess the health of your blood vessels and how the blood flows through them.

If you have circulation problems, your doctor may recommend that you have a coronary angiography to find out what's causing the problem. The results of an angiography can also help to determine suitable treatment options.

Types of angiography

There are several different types of angiography that may be used depending on which area of the body needs to be examined, including:
cerebral angiography - used to study the blood vessels in your head and neck

coronary angiography - used to study the blood vessels that supply the heart

pulmonary angiography - used to examine the blood vessels in the lungs

extremity angiography - used to examine the blood vessels in your arms and legs

renal angiography - used to examine the blood vessels in your kidneys

These are described in more detail below.

Cerebral angiography

A cerebral angiography may be used if it's thought that the blood vessels supplying blood to your brain (the carotid arteries) have become narrowed, disrupting the flow of blood. This can be dangerous because it could trigger a stroke or a transient ischemic attack (mini-stroke).

If you've had a stroke, a cerebral angiography can be used to assess the extent of the damage to the blood vessels. In some cases, it may be able to pinpoint the underlying cause of a stroke.

A cerebral angiography can also help to identify an aneurysm (a bulge in the blood vessel wall in your brain) or a brain tumour, which is an abnormal growth of tissue in the brain. Studying the flow of blood to the

tumour can help to determine whether it's growing, which can be useful when planning treatment.

Coronary angiography

A coronary angiography may be used if you have any of the following conditions:

heart attack – a serious medical emergency where the supply of blood to the heart is suddenly blocked, usually by a blood clot

angina – chest pain that occurs when the blood supply to the heart is restricted

A coronary angiogram may also be used if you have a heart condition which requires surgery. It helps to determine the most appropriate type of treatment for you. This might be:

a coronary angioplasty – a surgical procedure to widen blocked or narrowed coronary arteries

coronary artery bypass graft – a surgical procedure to divert blood around narrow or clogged arteries in order to improve the blood flow to the heart

aortic valve replacement – surgery to treat problems that affect the aortic and mitral valve, which is the valve that controls the flow of blood out of the left ventricle of the heart to the body's main artery, the aorta)

See coronary angiography for more information about the procedure.

Computerised tomography pulmonary angiography

Performing a traditional catheter angiography carries a high risk of complications. Therefore, another type of angiography, known as a computerised tomography pulmonary angiography (CTPA), is usually the preferred option.

When a person has a blood clot in one of the blood vessels in their lungs, this is known as a pulmonary embolism.

A CTPA involves injecting contrast dye into the blood vessels of your lungs before taking a CT scan. If you have a pulmonary embolism in one of your lungs, it will show up on the CT scan as a gap in your blood supply.

Extremity angiography

An extremity angiography may be used if it's thought that the blood supply to your leg muscles has become restricted. This is known as peripheral arterial disease and it causes a range of symptoms, the most common of which is painful cramping when walking.

Imaging tests, such as an ultrasound scan or CT scan, may be used instead of angiography to investigate how severe the condition is.

Renal angiography

Renal angiography may be recommended if you have symptoms which suggest that the blood supply to your kidneys has been blocked in some way.

These symptoms include:

high blood pressure (hypertension) that doesn't respond to treatment with medication

swelling in certain areas of your body, such as your feet, due to a build-up of fluid (oedema)

symptoms of kidney disease, such as itchy skin and blood in your urine

Atherosclerosis

Atherosclerosis is a condition in which one or more of the arteries becomes narrowed and hardened due to a build-up of fatty materials, such as cholesterol. These types of material are collectively known as plaques.

Atherosclerosis doesn't usually cause any noticeable symptoms, so the most effective method for early diagnosis is to identify people who are in high-risk groups and test them for the condition. High-risk groups for atherosclerosis include people who:

are over 40 years old

are overweight or obese

smoke or have a previous history of heavy smoking

have a high-fat diet

An angiography is usually only carried out if initial tests, such as blood cholesterol tests and blood pressure tests, suggest that atherosclerosis is likely.

Other uses

An angiography can also be used to:

locate the site of internal bleeding

detect blood clots

investigate injuries to organs

plan surgery that involves the blood vessels

How angiography is performed

Depending on the complexity of the investigation, an angiography takes between 20 and 90 minutes. You will usually be allowed to go home on the same day, although in some cases you may need to stay in hospital overnight.

An angiography is usually a planned procedure. However, it may occasionally be done on an emergency basis – for example, in the case of a heart attack.

In cases where an angiography is planned, you're likely to have an initial appointment to discuss a number of issues. As part of these discussions, you may be asked:

about your medical history

whether you have any allergies

whether you're currently taking any medication

You may also have a number of standard tests shortly before having an angiography. These may include:

blood pressure tests

blood tests to check how well organs, such as your kidneys or liver, are working

pulse check (to see how quickly your heart is beating)

Before having an angiogram, some people prefer to take a sedative to help them relax. In this case, you will be asked not to eat for several hours before having the procedure. Your care team will be able to give you a precise recommendation.

The procedure

Most angiography procedures are carried out using local anaesthetic to numb the area of skin where the catheter (see below) is going to be inserted. Sedation may be offered if needed.

General anaesthetic (where you're asleep) is sometimes used when young children need to have the procedure. This is because it may be upsetting for them or they may find it too difficult to stay still during the procedure.

A coronary angiography is carried out by a cardiologist (a doctor who specialises in heart disease). Peripheral vascular angiography is performed by an interventional radiologist (a doctor who specialises in using imaging studies). A nurse may also be present to assist with the procedure.

An intravenous (IV) line will be inserted into a vein in your arm. It can be used to deliver sedatives or any other medication as required. Electrodes (small, metallic discs) may also be placed on your chest to measure your heartbeat. A blood pressure monitor may be attached to your arm.

A small plastic tube called a sheath will be placed into one of your arteries. A catheter (a long, thin, flexible tube) is inserted through the sheath and on to the arteries being examined. Depending on the area of your body being examined, the catheter may be inserted into an artery in either your wrist, groin or leg.

The cardiologist or radiologist will use X-rays to help guide the catheter to the area being examined. Contrast dye will then be injected through the catheter, and a series of X-rays will be taken. This will allow a map of the arteries to be created.

The procedure isn't painful but you may feel a slight sensation of warmth or a mild burning sensation as the contrast dye moves through your blood vessels. It can take between 30 minutes and two hours to complete the procedure, depending on the complexity of your condition and what the radiologist finds.

In some cases, other procedures can be carried out during an angiography, such as inserting a balloon, or a small tube called a stent, through the catheter to open up a narrowed artery. This is known as an angioplasty.

Once the procedure has been completed, the catheter will be removed and the incision will be closed using manual pressure, a plug or a clamp. Afterwards

Following an angiography, you will usually be taken to a recovery ward. You will be asked to lie still for a few hours to prevent bleeding at the site of the incision.

After having an angiography, most people are able to leave hospital on the same day. However, you may occasionally need to stay in overnight for observation. You'll be able to eat and drink as soon as you feel ready to. It may take eight to 12 hours before you're well enough to resume normal activities.

Depending on what the radiologist finds during your angiography, they may be able to discuss your results with you shortly after the procedure.

Complications of angiography

Minor complications can occur following an angiography procedure but serious complications are rare.

Minor complications include:

bleeding or bruising at the site of the incision

infection at the incision site, which may need to be treated with antibiotics

a mild to moderate allergic reaction to the contrast dye; this can usually be controlled using anti-allergy medication

More serious complications can include:

kidney damage

heart attack

stroke

blood vessel damage, requiring further surgery

a serious, life-threatening allergic reaction (anaphylaxis) to the contrast dye

death

These serious complications are very rare. For example, only an estimated 1 in 1,000 people will have a stroke as a result of having an

angiography; approximately 1 in 50,000 to 150,000 people will experience anaphylaxis.

In almost every case, the benefit of having an angiography far outweighs any potential risk.