Angiography

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What is angiography?

Angiography is the X-ray imaging of blood vessels using contrast agents injected into the bloodstream through a thin plastic tube (catheter) that is placed directly in the blood vessel. The images taken are called angiograms. Angiography provides information about blood vessel abnormalities, such as narrowing, blockage, inflammation, abnormal widening and bleeding, using a liquid contrast agent (known as contrast medium – see **Iodine-containing contrast medium (ICCM)**. Contrast agents are injected into an artery or vein to make the blood vessels visible on X-rays. Angiography is also used to guide procedures that treat blood vessel abnormalities. If the artery is narrowed, a tiny balloon can be inflated (and occasionally a piece of metal tubing called a 'stent' can be inserted) to widen the artery and restore normal blood flow. This procedure is called angioplasty (see **Angioplasty and Stent Insertion**).

Angiography is also used to guide procedures where abnormal blood vessels need to be blocked off if they are bleeding (called 'embolisation'), or as part of other medical investigations or surgical treatments.

Angiograms can also be obtained using **computed tomography (CT)** by injecting contrast medium into a vein in the arm, or by **magnetic resonance imaging (MRI)**. CT or MRI angiography only show the appearances of the blood vessel, and cannot be used for treatment procedures.

Why would my doctor refer me for angiography?

- Determining the severity and the location of the narrowing/blockage of blood vessel causing your symptoms;
- Initiating treatment for a diseased blood vessel;
- locating a bleeding site, (often combined with embolisation, which stops the bleeding);

- Locating and removing a blood clot in a blocked blood vessel and restoring blood flow;
- Treating certain types of tumours by blocking their blood supply;
- Taking blood samples from specific areas to help diagnosis of your condition;
- Making a map of your blood vessels before surgery.

How do I prepare for angiography?

There are general preparations plus others that might be required depending on which part of the body is to be examined. The radiology facility where the angiography is carried out will advise of the preparations required in individual cases.

General preparation

- Some procedures require fasting (going without food) for 4 hours before the procedure, and some do not require fasting, in fact drinking fluid is encouraged. Specific advice will be given to you before your procedure.
- Bring all of your usual medication(s) (or a list of your medications) with you to your appointment.
- Bring any relevant previous imaging in your possession (film packet or CD containing angiograms, X-rays, CT scans, ultrasound or MRIs etc.), so that the medical staff can have all of the relevant information available on the day.
- It is useful to arrive at the radiology facility before the scheduled appointment time so that staff can obtain your medical history, collect information about your current medical problem and discuss the procedure with you.
- You will be asked to sign a consent form indicating that you understand what is going to happen, you are happy for the procedure to be carried out and any questions you might have, have been satisfactorily answered.
- If you have a history of kidney disease, have previously had an allergic reaction to contrast medium, suffer from any other allergies or have diabetes you must tell staff when you make the appointment and when you attend for the procedure. This ensures that the appropriate measures are taken to carry out the procedure with maximum safety.
- If you are taking metformin, aspirin, clopidogrel, warfarin or other blood thinning medications, you must inform staff when you make the appointment and when you attend for the procedure.
- Make arrangements with a relative or friend to drive you home after the procedure, as you might be given medication that will make you drowsy.
- If you live a significant distance from a hospital, it might be better, in the 24 hours after the procedure, for you to stay overnight either in hospital

or nearby. Speak to the radiology facility for advice before your procedure so that this can be arranged.

What happens during interventional angiography?

Before the procedure you will be asked to change into a surgical gown and might be given a mild sedative to help you to relax. Occasionally, angiography procedures require general anaesthetic so that you are asleep during the procedure, but this will be discussed with you before your angiography appointment.

During the procedure, you will be lying on a bed in the angiography suite of the radiology facility. This room is like an operating theatre with special X-ray equipment. A specialist doctor will explain and carry out the procedure using X-ray images to find the abnormal blood vessel(s) and treat them if appropriate.

Your heart beat, breathing, blood pressure, oxygen levels and other vital functions will be monitored during the procedure.

A small cannula (tube) will be inserted into a vein in your hand or arm. The area around the artery to be accessed for the procedure is painted with antiseptic and covered to minimise infection risk.

Local anaesthetic is given to numb the area (usually at the top of the right leg in the groin area) where a soft catheter (thin plastic tube) will be inserted into the blood vessel. In certain circumstances, the groin area is shaved before going into the angiography suite.

This injection will sting initially, but quickly becomes numb. Once the area is numb, and the thin catheter inserted, contrast medium is injected to make the blood vessels visible on a screen. The contrast medium is eliminated from the body in your urine after the procedure.

When X-ray images are being taken, you need to keep very still so the images are clear, and you might be asked to hold your breath for a few seconds at a time. You might experience a hot flush (lasting a few seconds) in the area being examined when contrast medium is injected.

The radiographer (medical imaging technologist) who will take the X-ray images and the radiologist (specialist doctor) carrying out the procedure will explain what will happen during angiography with instructions on what to do.

Are there any after effects of angiography?

After the treatment, you will usually be taken to a recovery room for monitoring by medical staff.

To prevent bleeding (haematoma) from the site where the catheter was inserted, either:

- A member of the medical staff might firmly press on the site for about 10 minutes, and you will lie flat for about 4 hours; or
- A special device is used to close the wound, and you will lie flat for about 2 hours.

You will be allowed to eat and drink after the procedure.

Angiography is usually carried out as a day procedure, but it might occasionally be necessary to be admitted to hospital overnight. This is usually planned, and because of one or more of the following:

- Other health problems you might have that require longer observation after angiography;
- You live a long way from the hospital or clinic where it would be difficult for you to reach the emergency department if bleeding occurs.
- If there is aftercare that requires treatment or observation in hospital, then you might be advised not to go home. If you are having the procedure in hospital, you might be admitted overnight from the radiology department. If you are having the procedure in a private radiology practice, they will arrange for your admission and transfer to hospital.

How long does angiography take?

The procedure will usually take less than an hour to carry out. If it is combined with another procedure, such as angioplasty or embolisation, the time will be longer (see – ‘What is an angiography?’ above).

You might be required to stay in a recovery room for up to 4 hours after the procedure.

What are the risks of angiography?

Bleeding or bruising

Bleeding (haematoma) occurs in less than 5% of angiograms. This is usually seen as a raised bruise at the site, usually the right groin, where the catheter is inserted. In most cases this is not serious, and will disappear after a few

weeks. One in 100 people having angiography will require observation in hospital overnight, and fewer than 1 in 500–1000 will require another procedure, surgery or blood transfusion to correct the bleeding.

If you discover a rapidly enlarging bruise where the catheter was inserted into the artery (usually in your groin) while you are resting in hospital immediately after the procedure, push on the area firmly and notify the medical or nursing staff. In the unlikely event that this happens after you have left the facility, push firmly on the area and contact either the staff where you had the angiography or your local doctor. If it is night-time or a weekend, you will need to contact your local emergency department for advice about what to do.

In fewer than 1% of cases, the procedure might damage a blood vessel, causing blockage. This will be noticed by the doctor at the time of the angiography, and might require a further procedure to treat the problem. You will be told about this, and frequently it can be corrected at the time with no further action required.

Contrast medium

Iodine-containing contrast medium is used. This has a very small risk of causing an allergic reaction. Such reactions range from itchiness and rash, to breathing difficulty and, extremely rarely, to death. It is very important to tell the medical team if you have had an allergic reaction to contrast medium in the past, or have allergies to any foods or substances before having angiography (see **Iodine-containing contrast medium (ICCM)**).

X-ray imaging

X-ray imaging does have risks; because it is a form of radiation (see **Radiation Risk of Medical Imaging for Adults and Children**). The doses of radiation are small, and the risk must be balanced against the benefits to the individual patient from having angiography.

What are the benefits of angiography?

Angiography helps to diagnose diseases of blood vessels, and provides information that helps determine the best treatment for your condition.

Commonly, angiography (with the aid of additional procedures: see What is Angiography) is used as a first step in the treatment of the medical problem.

The exact benefits will vary for each individual person.

Who does angiography?

A specially trained team of medical staff carries out angiography. The team includes a radiologist (specialist doctor) who will carry out the procedure, nursing staff and radiographers (medical imaging technologists) who operate the X-ray machine. If the angiography is being carried out as the first step of angioplasty, a vascular specialist doctor, who might be a surgeon, may carry out the procedure.

Where is angiography done?

Angiography is carried out in a specifically designed room called an angiography suite, which is similar to an operating theatre. A special X-ray machine is used to take and record the images or angiograms. There are also machines to record your blood pressure, pulse rate and other vital signs.

When can I expect the results of my angiography?

The time that it takes your doctor to receive a written report on the test or procedure you have had will vary, depending on:

- the urgency with which the result is needed;
- the complexity of the examination;
- whether more information is needed from your doctor before the examination can be interpreted by the radiologist;
- whether you have had previous X-rays or other medical imaging that needs to be compared with this new test or procedure (this is commonly the case if you have a disease or condition that is being followed to assess your progress);
- how the report is conveyed from the practice or hospital to your doctor (i.e. phone, email, fax or by post).

Not infrequently, the doctor carrying out the procedure will tell you the results of the angiogram and any required treatment at the time of the procedure. If this does not happen, you can ask a member of staff when your own doctor is likely to have the written report.

It is important that you discuss the results with the doctor who referred you, either in person or on the telephone, so that they can explain what the results mean for you.

Useful websites about angiography:

Society of Interventional Radiology
www.sirweb.org/patients/angiography

**The author has no conflict of interest with this topic.*

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