

Coronary angioplasty (stent)

Introduction

A coronary angioplasty (stent) is a procedure used to widen blocked or narrowed coronary arteries.

A short wire-mesh tube, called a stent, is inserted into an artery to allow blood to flow more freely through it.

Coronary angioplasty is sometimes known as percutaneous transluminal coronary angioplasty (PTCA) or percutaneous coronary intervention (PCI).

Why is a coronary angioplasty necessary?

Like all organs in the body, the heart needs a constant supply of blood. This is supplied by two large blood vessels called the left and right coronary arteries. In older people, these arteries can become narrowed and hardened. This is known as atherosclerosis.

Hardening of the coronary arteries can restrict the flow of blood to the heart, which can lead to angina.

The most common symptom of angina is chest pain, which is usually triggered by physical activity. While many cases of angina can be treated with medication, a coronary angioplasty may be required to restore the blood supply to the heart in severe angina.

Coronary angioplasties are also often used as an emergency treatment after a heart attack.

Read more information about why a coronary angioplasty is necessary.

What are the benefits of a coronary angioplasty?

If you have angina, an angioplasty can:

relieve your pain

reduce your need for angina medication

ease symptoms such as breathlessness

enable you to be more active

improve your ability to do everyday activities, such as climbing stairs and walking any distance

make you feel generally better so you're more able to do the things you want to do, such as going to work and enjoying a social life

If you've had a heart attack, an angioplasty can:

increase your chances of surviving by one-third more than clot-busting treatment (thrombolysis) can

reduce your chances of having another heart attack

How is it performed?

You may have a pre-assessment of your health a few days before the operation. This may involve blood tests and a general health check. Being as fit as you can be before the procedure can help your recovery from a coronary angioplasty.

During an angioplasty, a flexible tube called a catheter is used to insert a mesh tube, known as a stent, into the coronary artery.

A small balloon is inflated to open the stent, which pushes against the artery walls. This widens the artery, squashing fatty deposits against the artery wall so that blood can flow through it more freely.

The procedure usually takes around 30 minutes, but it can take longer depending on how many sections of your artery need treatment. You will normally be able to go home the day after a coronary angioplasty. You will need to avoid driving for around a week.

How safe is a coronary angioplasty?

A coronary angioplasty is one of the most common types of treatment for the heart. Coronary angioplasties are most commonly performed in people who are 65 years of age or older as they are more likely to have angina.

A coronary angioplasty does not involve making major incisions in the body and is usually carried out safely in most people. Doctors refer to this as a minimally invasive form of treatment.

The risk of complications from a coronary angioplasty varies depending on individual circumstances. The risk increases slightly with age and if you have certain conditions. If you have an unrelated serious health condition, such as cancer or liver failure, the risks of treatment may outweigh the benefits.

Are there any alternatives?

A coronary angioplasty may not be technically possible if your arteries are different from normal, for example if there are too many narrow sections.

In this circumstance, an alternative surgical procedure, known as a coronary artery bypass graft (CABG), may be considered. Read more information about the alternatives to a coronary angioplasty.

Why do I need a coronary angioplasty (stent)?

A coronary angioplasty is necessary when hardening and narrowing of the coronary arteries prevents the heart from getting enough blood to function normally.

Atherosclerosis

Hardening of the arteries is known as atherosclerosis. Your arteries harden and narrow naturally as you get older, but this process can be dangerously sped up by:

eating a high-fat diet

smoking

having high blood pressure (hypertension)

having diabetes

your ethnicity (where you were born and your cultural background)

For reasons that are not fully understood, high blood pressure and atherosclerosis are more common among people of African-Caribbean and south Asian (Indian, Pakistani, Bangladeshi and Sri Lankan) origin.

Angina

Once the hardening and narrowing of your coronary arteries reaches a certain point, your heart no longer receives the blood supply it needs to work properly. This can trigger the symptoms of angina, including:

pain or discomfort in your chest

breathlessness

When the symptoms of angina start, it is sometimes called an angina attack.

There are two types of angina:

stable angina, where symptoms only last a few minutes, are triggered by physical activity and can be relieved with medication

unstable angina, where symptoms develop even when you are resting, last longer than five minutes and cannot usually be relieved with medication

If your symptoms do not respond to angina medication, a coronary angioplasty may be recommended.

Heart attack

A coronary angioplasty can be used as an emergency treatment for a heart attack if the heart attack was caused by an interruption to your heart's blood supply.

How a coronary angioplasty (stent) is performed

How can I decide where to get treatment?

Look for a cardiac centre that does at least 500 angioplasties each year. Doctors call this a high-volume centre. Choose a cardiologist (heart specialist) who does more than 100 to 200 angioplasties a year. These specialists are known as "interventional cardiologists".

You may have a pre-assessment of your health a few days before the operation. This will give you an opportunity to discuss any concerns with your surgeon.

Before a coronary angioplasty is carried out, the arteries near your heart need to be assessed to make sure the operation is technically possible. This is done using a test called coronary angiography.

During coronary angiography, a long, flexible plastic tube called a catheter (about the width of the lead in a pencil) is inserted into a blood vessel, either in your groin or arm.

The tip of the catheter is guided using an X-ray to your heart or the arteries that supply your heart. A special fluid that shows up on X-rays, known as contrast medium, is injected through the catheter. The resulting pictures are called angiograms.

You may be asked not to eat or drink anything for four hours before a coronary angioplasty. You will usually be able to take most medications as normal up to the day of the procedure, with the exception of blood-thinning medication (anticoagulants), such as warfarin. You may also need to alter the timing of any diabetes medication you take. Your medical team can give you more information about this.

The operation

A coronary angioplasty usually takes place in a room called a catheterisation laboratory, rather than in an operating theatre. A catheterisation laboratory is a room that is fitted with X-ray video to allow the doctor to monitor the procedure on a screen.

Coronary angioplasty usually takes about 30 minutes, although it may take longer depending on how many sections of your artery need to be treated.

You will be asked to lie on your back on an X-ray table. You will be linked up to a heart monitor and given a local anaesthetic to numb your skin. An intravenous (IV) line will also be inserted into a vein, in case you need to have painkillers or a sedative.

The cardiologist (heart specialist) will make a small incision in the skin of your groin or wrist and will insert a catheter. They will guide the

catheter through the artery in your groin or arm, passing it through the main artery in your body (the aorta) and into the opening of your left or right coronary artery.

A thin, flexible wire is then passed down the inside of the blood vessel being treated to beyond the narrowed area. A small, sausage-shaped balloon is passed over the wire to the narrowed area and inflated for up to 60 seconds. This squashes the fatty material on the inside walls of the artery to widen it. This may be done several times.

While the balloon is inflated, the artery will be completely blocked and you may have some chest pain. However, this is normal and is nothing to worry about. The pain should go away when the balloon is deflated. Ask your cardiologist for pain medication if you find it uncomfortable.

You should not feel anything else as the catheter moves through the artery, but you may feel an occasional missed or extra heartbeat. This is nothing to worry about and is completely normal.

If you are having a stent inserted (see below), it will open up as the balloon is inflated and will be left inside your artery.

When the operation is finished, the cardiologist will check that your artery is wide enough to allow blood to flow through more easily. This is done by monitoring a small amount of contrast dye as it flows through the artery.

The balloon, wire and catheter are then removed and any bleeding is stopped with a dissolvable plug or firm pressure.

Going home

A coronary angioplasty often involves an overnight stay in hospital, but many people can go home on the same day if the procedure is straightforward. After the operation, you will not be able to drive for one week so you will need to arrange for someone to drive you home from hospital. Read more information about recovering from a coronary angioplasty.

What type of stent?

A stent is a short, wire-mesh tube that acts like a scaffold to help keep your artery open. There are two main types of stent:

bare metal (uncoated) stent

drug-eluting stent, which is coated with medication that reduces the risk of the artery becoming blocked again

The biggest drawback of using bare metal stents is that, in around 30% of cases, the arteries begin to narrow again. This is because the immune system sees the stent as a foreign body and attacks it, causing swelling and excessive tissue growth around the stent.

Many cardiologists avoid this problem by using drug-eluting stents. These are coated with medication that reduces the body's abnormal response and tissue growth.

Once the stent is in place, the medication is released over time into the area that is most likely to become blocked again. The two most researched types of medication are:

"-limus" drugs (such as sirolimus, everolimus and zotarolimus), which have previously been used to prevent rejection in organ transplants
paclitaxel, which inhibits cell growth and is commonly used in cancer chemotherapy

The use of drug-eluting stents has reduced the rate of arteries re-narrowing from around 30% to below 10%. However, as drug-eluting stents are still a relatively new technology, it is uncertain how effective or safe they are in the long term.

Before your procedure, discuss the benefits and risks of each type of stent with your cardiologist.

If you have a stent, you'll also need to take certain anti-platelet drugs to help reduce the risk of blood clots forming around the stent. These include:

aspirin, taken every morning for life

clopidogrel, taken for 11 or 12 months depending on whether you have had a bare metal or drug-eluting stent, or whether you have had a heart attack

prasugrel, which is used as an alternative to clopidogrel in some hospitals

Recovering from a coronary angioplasty (stent)

You will normally be able to leave hospital the day after a coronary angioplasty. Arrange for a friend or family member to take you home.

Before you leave hospital, you should be told about any medication you need to take. You may also be given advice on improving your diet and lifestyle. You will be given a date for a follow-up appointment to check on your progress.

You may have a bruise under the skin where the catheter was inserted. This is not serious, but it may be sore for a few days. Occasionally, the wound can become infected. Keep an eye on it to check that it's healing properly. Tell your DOCTOR if it becomes red and sore.

Returning home

After having a coronary angioplasty, avoid doing any heavy lifting for about a week or until the wound has healed.

Do not drive for a week after the operation. If you drive a heavy vehicle for a living, such as a lorry or a bus, you must inform the DVLA that you have had a coronary angioplasty. They will arrange further testing before you can return to work. You should be able to drive again as long as:

you meet the requirements of an exercise/function test

you do not have another disqualifying health condition

For more information about how a coronary angioplasty may affect your eligibility to drive, visit the DVLA website.

If you have had a planned coronary angioplasty, you should be able to resume your normal activities within a week. However, if you have had an emergency angioplasty following a heart attack, it may be several weeks or months before you recover fully.

Sex

If your sex life was previously affected by angina, you may be able to have a more active sex life as soon as you feel ready after a coronary angioplasty. If you have any concerns, speak to your DOCTOR. According to experts, having sex is the equivalent of climbing a couple of flights of stairs in terms of the strain that it puts on your heart.

Further treatment

Most people need to take blood-thinning medications for up to one year after having an angioplasty. This is usually a combination of low-dose aspirin and a medication called clopidogrel. It is very important to follow your medication schedule as stopping medication early greatly increases the risk of the stent becoming blocked suddenly and causing a heart attack.

Clopidogrel blocks one of the chemicals that the body uses to trigger blood clotting.

Side effects of clopidogrel include:

diarrhoea

indigestion

abdominal pain

excessive or unusual bleeding, such as bleeding when injected, nosebleeds or blood in your urine (the loss of blood is usually minimal and nothing to worry about)

skin that may bruise more easily

Because of the side effect of excessive bleeding, men may prefer to shave with an electric razor.

The course of clopidogrel will be withdrawn after the agreed period, but most people need to continue taking low-dose aspirin for the rest of their life.

You may need to have another angioplasty if your artery becomes blocked again and your angina symptoms return. Alternatively, you may need a coronary artery bypass graft (CABG).

Risks of coronary angioplasty (stent)

As with all surgery, coronary angioplasty carries a risk of complications. Several factors increase your risk of experiencing these complications. Who's at risk?

Factors that increase your chance of having complications include:

Your age – the older you are, the higher the risk. For example, a 60-year-old man with no other risk factors has a less than 1% risk of developing complications, while an 80-year-old has a 3% risk.

Whether the surgery was planned for angina or emergency treatment after a heart attack – emergency surgery is always riskier because there is less time to plan it.

Whether you have kidney disease – the intravenous dye used during an angioplasty can occasionally cause further damage to your kidneys.

Whether more than one coronary artery has become blocked – this is known as multi-vessel disease.

Whether you have a history of serious heart disease – this could include heart failure.

Your cardiology team can give you more information about your individual circumstances and level of risk.

Complications

Complications that can occur after an angioplasty include:

a heart attack, which is estimated to occur in 1 in 100 cases

a stroke, which is estimated to occur in 1 in 200 cases

excessive bleeding after the operation, which is estimated to occur in 1 in 200 cases and requires a blood transfusion

death, which is estimated to occur in 1 in 500 cases

Other heart surgery options

The most widely used surgical alternative to a coronary angioplasty is a coronary artery bypass graft (CABG).

Coronary artery bypass graft

A coronary artery bypass graft (CABG) is surgery to bypass a blockage in an artery. This is done using segments of healthy blood vessel, called grafts, taken from other parts of the body. Segments of vein from your legs or chest are used to create a new channel through which blood can be directed past the blocked part of the artery. This allows more blood to get through into the heart muscle.

Complications of CABG are uncommon, but are potentially serious. They include:

a heart attack, which is estimated to occur in 1 in 50 cases

a stroke, which is estimated to occur in 1 in 50 cases

You may not always be able to choose between having a coronary angioplasty or a CABG.

A CABG is usually recommended when multiple coronary arteries have become blocked and narrowed. However, it is invasive surgery so may not be suitable for people who are particularly frail and in poor health.

A coronary angioplasty may not be possible if the anatomy of the blood vessels near your heart is abnormal.

Coronary angioplasty or CABG?

If you can choose between having a coronary angioplasty or a CABG, be aware of the advantages and disadvantages of each technique.

As a coronary angioplasty is minimally invasive, you will recover from the effects of the operation quicker than you will from a CABG. The procedure also has a lower complication rate, but research has shown that up to one person in four who has a coronary angioplasty requires further treatment because the widened artery narrows again.

However, in the future, the number of people who need further surgery will probably fall sharply because of the use of drug-eluting stents.

CABG has a longer recovery time than coronary angioplasty and a higher complication rate. However, only 1 person in 10 who has a CABG requires further treatment. Also, research published in 2009 found that CABG is usually a more effective treatment option for people who are over 65 years of age and for people with diabetes.

Discuss the benefits and risks of both types of surgery with your surgical team.

Percutaneous transluminal coronary rotational atherectomy (PTCRA)

Percutaneous transluminal coronary rotational atherectomy (PTCRA) is a similar technique to coronary angioplasty. However, rather than using a balloon and a stent to expand the artery, a small diamond cutter is first used to remove the fatty deposit that is blocking the artery

It is usually used when the coronary artery has a high level of calcium in it. Calcium makes the artery very hard and can prevent balloons or stents expanding properly to relieve the narrowing. Once the small diamond cutter has been used, the artery is then treated with balloons and stents as normal.

Evidence has found that PTCRA is no more effective than a coronary angioplasty, so it is usually only carried out in people who are not suitable for conventional coronary angioplasty.