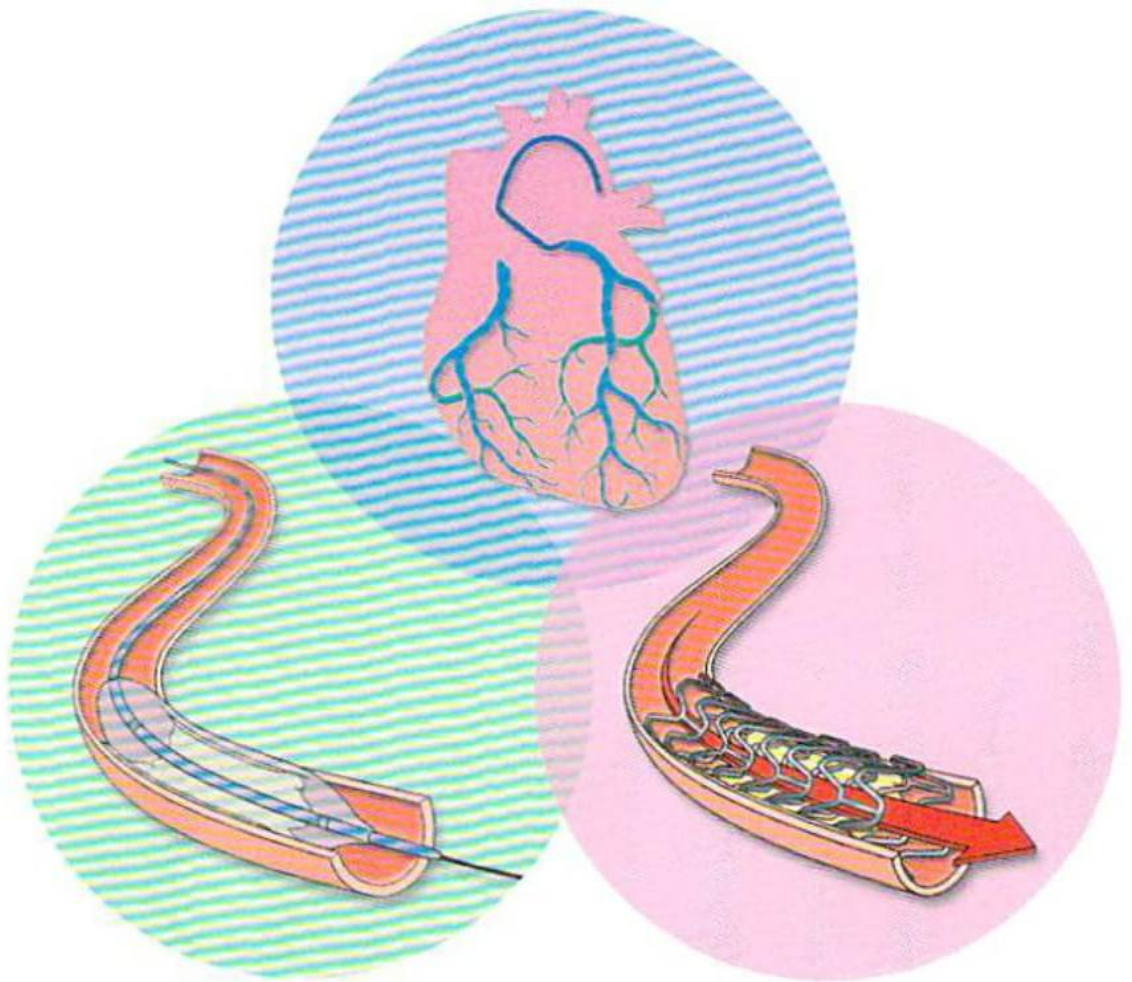


# Coronary Artery Procedures



***A Patient's Guide***

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*This booklet is not intended to replace professional medical care. Only your doctor can diagnose and treat medical problems.*

Your doctor has recommended that you have one or more procedures because fatty deposits have narrowed your coronary arteries (the vessels that supply blood to your heart). Now, you probably have questions and concerns about these procedures. This booklet can help answer many of your questions.

### **What Are Coronary Procedures?**

Coronary procedures allow doctors to open or widen narrowed coronary arteries without surgery.

During a coronary procedure, a long, flexible tube, called a **catheter**, is inserted into a blood vessel and advanced toward the heart. Doctors use the catheter to diagnose narrowed coronary arteries. They can also use the catheter to widen narrowed arteries and improve the flow of blood to the heart muscle.

### **Which Procedures Do You Need?**

Four procedures are discussed in this booklet:

- **Cardiac catheterization** helps doctors *diagnose* a heart problem accurately and allows them to choose the most effective treatment.
- **Balloon angioplasty, stents, and atherectomy** are different procedures used to *treat* blockages in the coronary arteries. Doctors may perform one, two, or all three procedures.

Because patients are not all alike, and because each procedure has risks as well as benefits, your doctor will recommend the procedures that are best for you.



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## How the Heart Works

Before discussing coronary artery procedures, it helps to understand how the heart works.

### The Heart as a Pump

The heart is a hollow organ that constantly pumps blood throughout the body. It is made of strong muscle tissue, called **heart muscle** (myocardium).

The heart has four chambers: two chambers on the left side and two on the right. The upper chamber on each side, called an **atrium**, receives and collects blood. The lower chamber on each side, called a **ventricle**, pumps blood out of the heart.

The four chambers work together to contract and pump blood. As it circulates, blood delivers oxygen and nutrients throughout the body.

### The Coronary Arteries

In order to keep pumping day after day, the heart needs its own supply of oxygen. The **coronary arteries** are the vessels that carry oxygen-rich blood to the heart muscle.

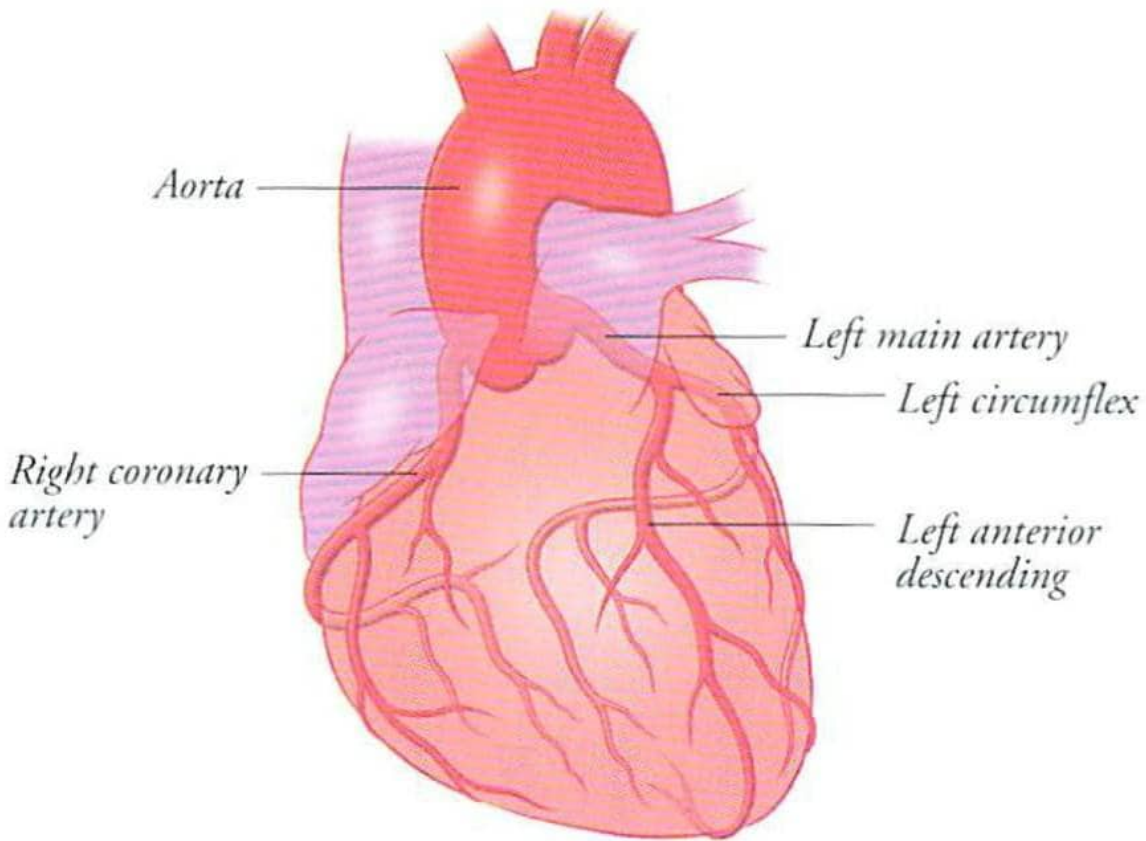
As blood leaves the left ventricle, it is pumped into the **aorta**, the body's main artery. At the beginning of the aorta, near the top of the heart, two coronary arteries start. They are called the "left" and "right" coronary arteries.

The first part of the left coronary artery is called the **left main artery**. It is about as wide as a drinking straw and less than an inch long.

The left main artery then branches into two slightly narrower arteries: the **left anterior descending**, which travels down the front side of the heart; and the **left circumflex**, which circles around the left side and then to the back of the heart.

The **right coronary artery** branches off the aorta, circles around the right side, and then travels to the back of the heart.

The coronary arteries travel on the outer surface of the heart and divide into smaller branches. These branches then penetrate deep into the heart muscle, carrying oxygen-rich blood to all the cells.



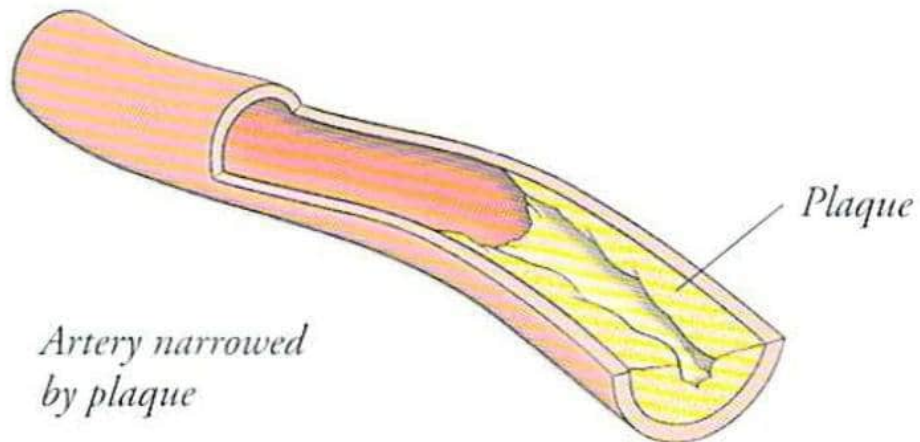
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## Coronary Heart Disease

The inside walls of your arteries are normally smooth and flexible, which allows blood to flow through them easily. Over the years, fatty deposits may build up on the inside of an artery's wall.

As these fatty deposits, called **plaque**, continue to build up, they narrow the artery and can reduce or even block the flow of blood.

When plaque builds up in the coronary arteries, the result is **coronary heart disease**. Blood flow in the coronary arteries may be reduced enough to cause angina or heart attack.



**Angina** is pain or discomfort in the chest, arm, or jaw that occurs when not enough blood flows to the heart muscle. Angina is a warning sign that the coronary arteries may be narrowed or blocked.

Angina typically occurs during physical exertion or emotional stress, when the heart works harder and needs more oxygen. Angina generally lasts for only a few minutes and goes away with rest.



Patients who have coronary heart disease are at an increased risk of having a **heart attack** (myocardial infarction). A heart attack occurs when a coronary artery becomes totally blocked, usually by a blood clot. The area of the heart muscle that receives blood from that artery dies and turns into scar tissue.

In general terms, the larger the coronary artery that is blocked, the larger the area of damage. If other coronary arteries are also diseased, the area of damage to the heart muscle tends to be even larger.

Following a heart attack, the damaged heart may not pump as well as a normal heart. This may lead to **heart failure**. In heart failure, fluid tends to build up in the lungs and other parts of the body. Common symptoms of heart failure include shortness of breath, swelling of the feet and legs, and fatigue.

Certain conditions and habits, called **risk factors**, can increase the build-up of fatty deposits in your arteries. People who smoke cigarettes or have high blood cholesterol, for example, are more likely to have a heart attack than people without these risk factors. By changing your lifestyle, you can help control some of these risk factors (see page 36).

## Your Medical Evaluation

If your doctor thinks you may have heart disease, he or she will order one or more of these tests:

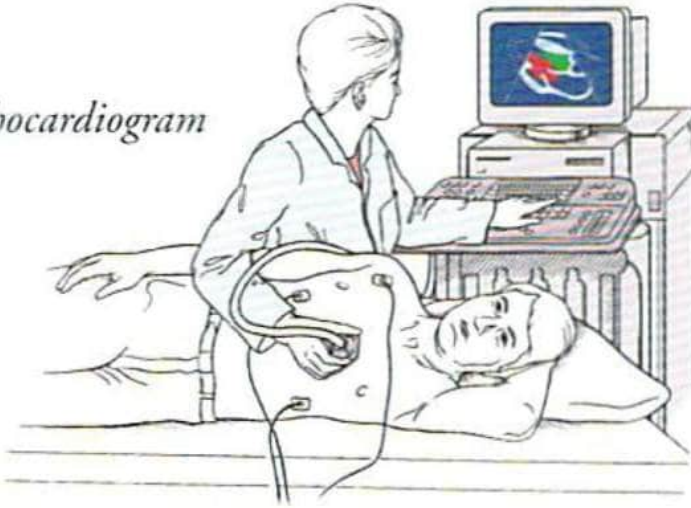
- An **electrocardiogram**, or **ECG**, records the electrical activity of your heart at rest. It can show a new heart attack, previously damaged heart muscle, enlarged heart chambers, abnormal heart rhythms, and other heart conditions.
- An **exercise ECG test** (or stress test) is done while you walk on a treadmill or pedal a stationary bicycle. It allows doctors to see how well your heart pumps when it is made to work harder. The exercise ECG test can help detect problems that may not show up on a resting ECG.



- An **echocardiogram** uses ultrasound waves to create an image of the heart and the pattern of blood flow through it. It shows how well the heart is pumping. In patients who have had a heart attack, the echocardiogram helps assess how badly the heart muscle was damaged.

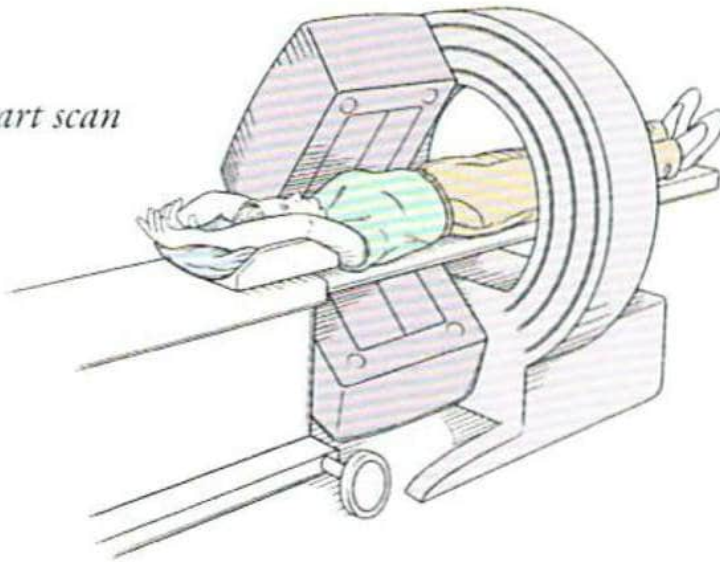


*Echocardiogram*



- A **heart scan** (or thallium scan) uses a radioactive substance, called a tracer, to produce images of the heart muscle. In patients with coronary heart disease, the heart scan helps identify areas of the heart muscle that do not receive enough blood.

*Heart scan*



If these tests show that you may have coronary heart disease, your doctor will most likely recommend that you also have cardiac catheterization (see page 14).

## Treatment Options

There are several ways to treat coronary heart disease, including medications, balloon angioplasty, stents, atherectomy, and bypass surgery.

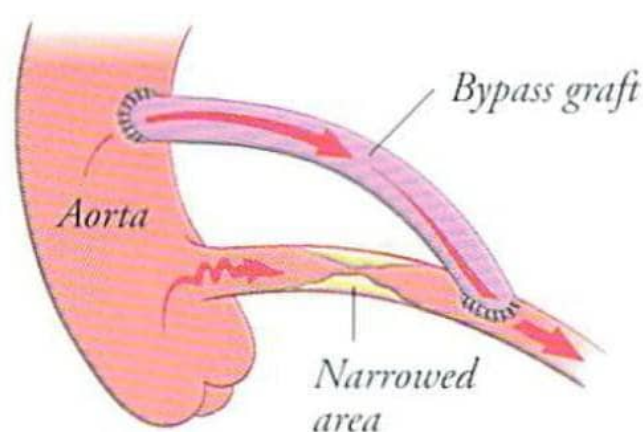
- **Medications** can help reduce symptoms of angina by increasing the amount of oxygen that reaches the heart muscle and/or by reducing the amount of oxygen the heart needs. However, medications cannot open narrowed coronary arteries.
- **Balloon angioplasty** is used to widen narrowed coronary arteries without surgery. It helps relieve symptoms of angina by improving the flow of blood to the heart muscle.

Angioplasty is a relatively simple procedure that does not require general anesthesia. Most patients remain in the hospital only a day or two and can resume their normal activities within a few days.

Although angioplasty is successful in most cases, it does have limitations. In particular, the artery may narrow again, usually within the first 6 months. Also, angioplasty may not be an option when an artery is totally blocked, or when there are multiple lesions (narrowed areas) in several major arteries.

- A **stent** is a small device that is placed in an artery to help keep it open. A stent may be needed when angioplasty cannot open the artery wide enough. Other times, it may be implanted to help reduce the chances that the artery will narrow again. The stent is a permanent implant that remains in the artery.

- **Atherectomy** is like balloon angioplasty in many ways, except that instead of a balloon, the catheter carries a tiny drill or a cutter at the tip. This is most useful when the plaque is large or hardened.
- During **coronary bypass surgery**, surgeons use a graft—a blood vessel from the leg or chest. One end of the graft is attached to the aorta, and the other end is sewn to the artery, beyond the narrowed or blocked area. The graft creates a detour (bypass) that allows blood to flow around the diseased area.



Bypass surgery requires general anesthesia and usually 4 to 7 days in the hospital. It takes up to 3 months to fully recover after this type of surgery.

Bypass surgery may be the best treatment option for patients who have severe disease in two or three major coronary arteries, especially if the heart is weakened and does not pump well.

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Your doctor can explain the benefits and risks of these treatments, and advise you on the option that is best for you.



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## Preparing for the Procedure

Unless you are already in the hospital, you will most likely be asked to arrive in the morning on the day of the procedure, or possibly the night before.

You may have several routine tests, such as an ECG, x-rays, and blood tests. (These tests may be done a few days before the procedure.)

The doctor will review your medical history and examine you. (You may see the doctor at the office several days before the procedure.)

The doctor or nurse will talk with you about the procedure and its purpose, benefits, and risks. This is a good time to ask questions and, most important, to share any concerns you may have. You will then be asked to sign a consent form.

A nurse will shave and cleanse the area where the catheters will be inserted. This is usually at the groin (the fold between the thigh and abdomen). In some cases, it may be at the wrist or arm. Shaving and cleansing make it easier to insert the catheters and help to prevent infection.

An intravenous (IV) line will be inserted into a vein in your arm. This line allows drugs to be injected directly into the vein, if they are needed. To help you relax, you will be given a sedative.

If you wear dentures, hearing aids, or glasses, you will most likely be allowed to keep them on.

## Before the Procedure

- Generally, you'll be asked not to eat or drink anything for 6 to 8 hours before the procedure. This helps prevent nausea. You may have small sips of water to take your medications.
- Check with your doctor several days before the procedure. You may be asked to take some medications (such as aspirin) for a few days before an angioplasty.
- Make arrangements with a friend or family member to drive you to and from the hospital. You will not be permitted to drive home after the procedure, since you may be sedated.
- Pack a small bag for your hospital stay. You may want to include a robe, slippers, pajamas or nightgown, and toiletries.
- Bring a list of the names and dosages of all the medications you are taking.
- Tell the doctor or nurse if you have had any allergic reactions to medications or x-ray dye (contrast), iodine or seafood, or if you have a history of bleeding problems.
- For your comfort, empty your bladder as much as possible before the procedure begins. There will also be a bedpan or a urinal, should you need it during the procedure.



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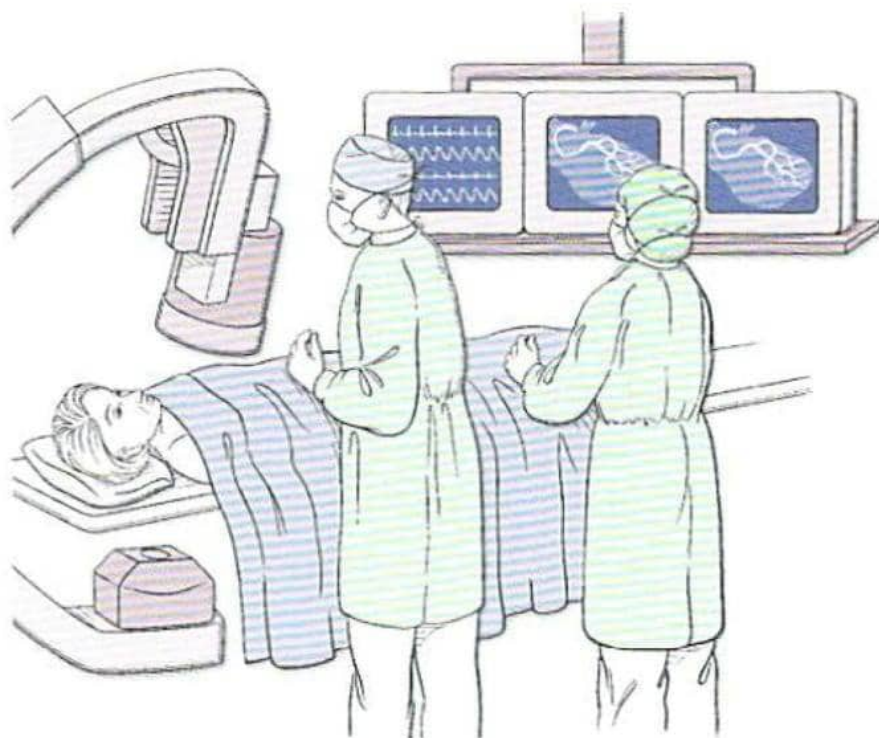
## Cardiac Catheterization

Before your condition can be treated, doctors need to perform a cardiac catheterization to help *diagnose* the problem in your coronary arteries. Based on the results, they may perform additional procedures, such as balloon angioplasty and/or a stent implant, to *treat* the blockages in the arteries.

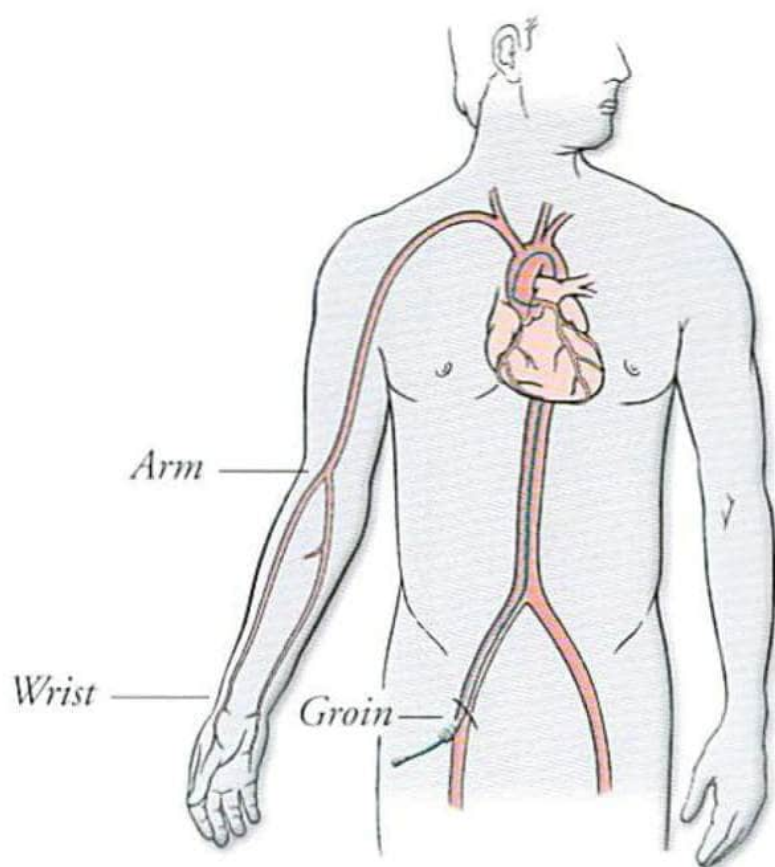
You will be taken to the **cath lab** in a wheelchair or on a movable bed. Then you will be helped onto an x-ray table. The table has a large x-ray camera above it and television screens close by. There are also heart monitors and other instruments.

The cath lab team generally includes a cardiologist, an assistant, nurses, and technologists.

Once you are positioned on the x-ray table, you will be connected to several monitors and then covered with sterile sheets. The staff will be wearing sterile gowns, gloves, and possibly masks.







*Possible sites where the catheters are inserted*

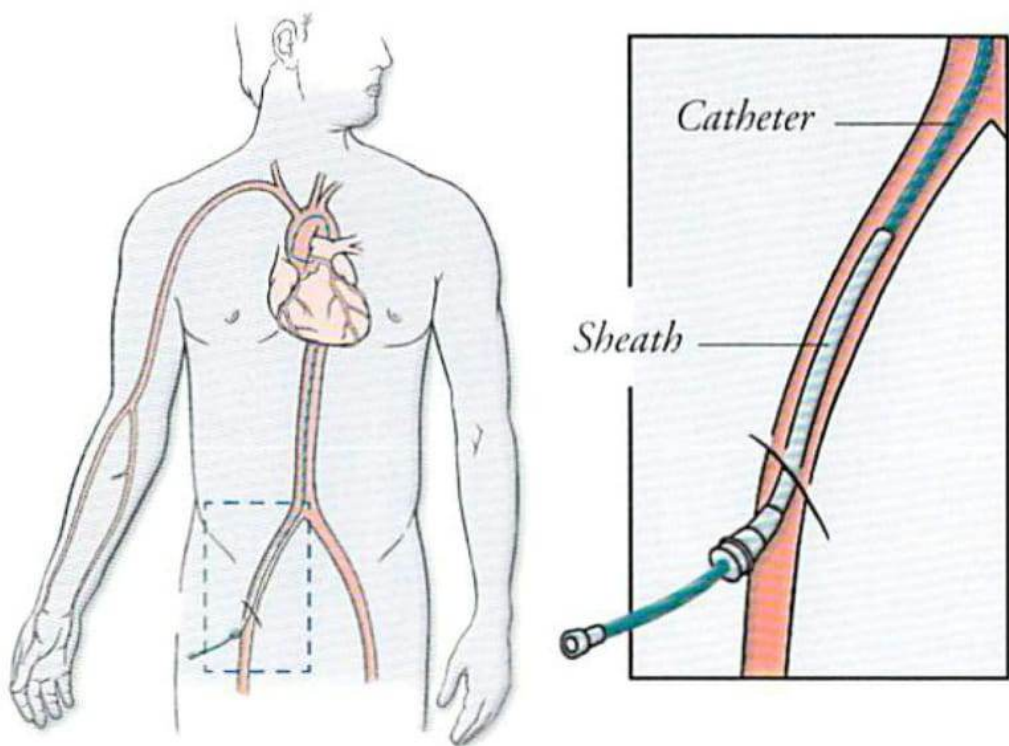
### **What Happens During Catheterization?**

The site where the catheters will be inserted is usually in the groin. Sometimes it is in the wrist or arm.

The site is cleansed thoroughly. A local anesthetic is injected into the skin with a tiny needle to numb the area. This may cause a stinging sensation.

A small incision is made in the skin, and a needle is used to puncture the blood vessel (usually an artery). A guidewire (a soft and flexible wire) is threaded into the artery. A short plastic tube, called a **sheath**, is then slipped over the guidewire and into the artery. The guidewire is then removed.

Once the sheath is in place, doctors can insert and remove several different catheters without having to use a needle each time.



The catheter is inserted into the artery and guided toward the heart, while the staff watches its progress on a television screen. The catheter may be removed and replaced several times. This is done to reach each of the heart chambers or coronary arteries.

Once the catheter is inside the heart, the doctors can measure the pressures in the left ventricle (the main pumping chamber) and take pictures of the coronary arteries and left ventricle.

If you are also having a **right-heart catheterization**, a special catheter is inserted into a *vein* and is guided to the right side of the heart. This is usually done to measure the pressures inside the right heart chambers and in the lungs, especially in people who have a weakened heart.

## **What You Can Expect**

You will be given medication to help you relax and make you drowsy. You may be awake, or you may sleep through part or all of the procedure. The staff will be monitoring you at all times.

You may be asked to take a deep breath and hold it, to keep the pictures from blurring. You may also be asked to cough forcefully several times, to help move the dye through the heart.

The procedure generally is not painful, although you may feel some pressure as the catheters are inserted. You will not feel the catheters as they move through the blood vessels and into your heart. For many, the most difficult part of the procedure is having to lie still for a long time on a hard table.

As x-ray contrast is injected into the heart, you may feel a warm sensation (“hot flash”) through your body, lasting for 20 to 30 seconds. You may also feel nausea, chest discomfort, or a mild headache.

A complete cardiac catheterization procedure usually takes from one to two hours. If you feel pain or discomfort at any time during the procedure, let the staff know.

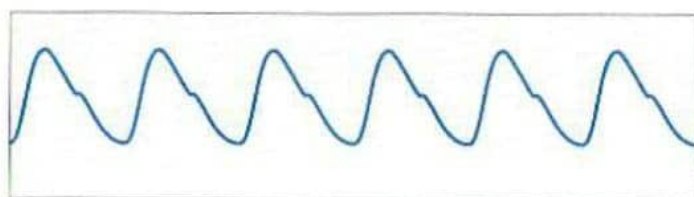


## What Does Catheterization Show?

Cardiac catheterization allows doctors to measure the pressures inside the heart, study how well the heart is pumping blood, and take pictures of the coronary arteries and the heart chambers.

### ■ *Measuring the Pressures*

Blood within the heart or vessels exerts pressure. As a heart chamber contracts and pumps blood, it creates **pressure waves**. These pressure waves are transmitted through the catheter, displayed on monitor screens, and can be recorded. Measuring the pressures inside the heart allows doctors to assess how well the heart is pumping blood.



*A tracing showing pressure waves in an artery.*

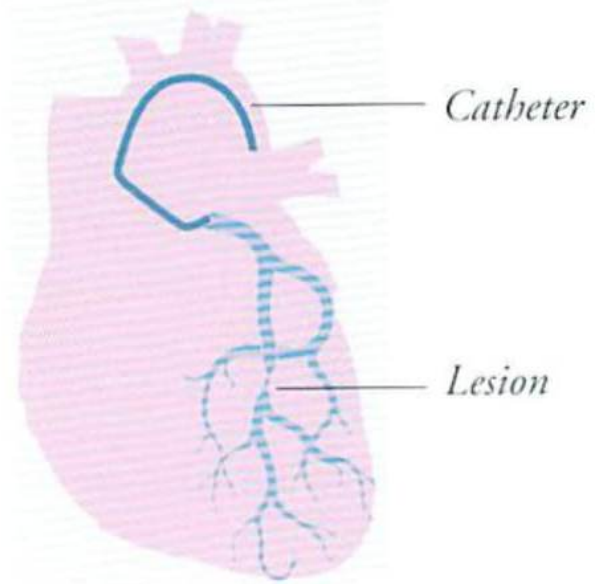
### ■ *Coronary Angiography*

During coronary angiography, x-ray dye, or **contrast**, is injected through the catheter into the coronary arteries. As the contrast fills the arteries, they can be clearly seen on x-rays. The resulting pictures, called **angiograms**, can be recorded and stored.

A normal coronary artery has smooth walls and tapers down (gets smaller) gradually. A diseased artery may show an abnormal narrowing, called a “**lesion**.” Other times, the artery may be completely blocked. Multiple “views” are taken, at different angles, to better show the lesions or blockages in the arteries.

### *Coronary angiography*

*Contrast is injected into the left coronary artery through the catheter. As the artery fills with contrast, it can be viewed on the television screen. Here, a lesion can be seen in the left anterior descending coronary artery.*



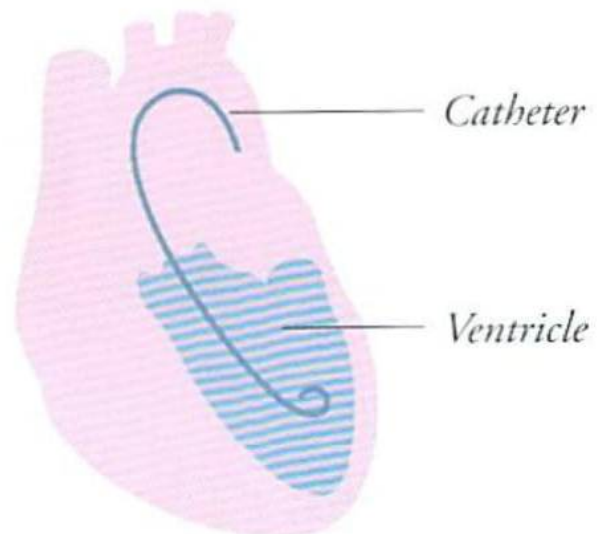
### ■ *Left Ventriculography*

During left ventriculography, x-ray contrast is injected through a special catheter into the left ventricle, the main pumping chamber. The resulting pictures show the ventricle as it contracts and pumps blood.

Normally, all areas of the ventricle contract forcefully. If a particular area does not contract as well as it should, it may not be receiving enough blood because of a narrowed or blocked coronary artery.

### *Left Ventriculography*

*Contrast is injected into the left ventricle through a special catheter. The heart's pumping action can be viewed on the television screen and recorded.*





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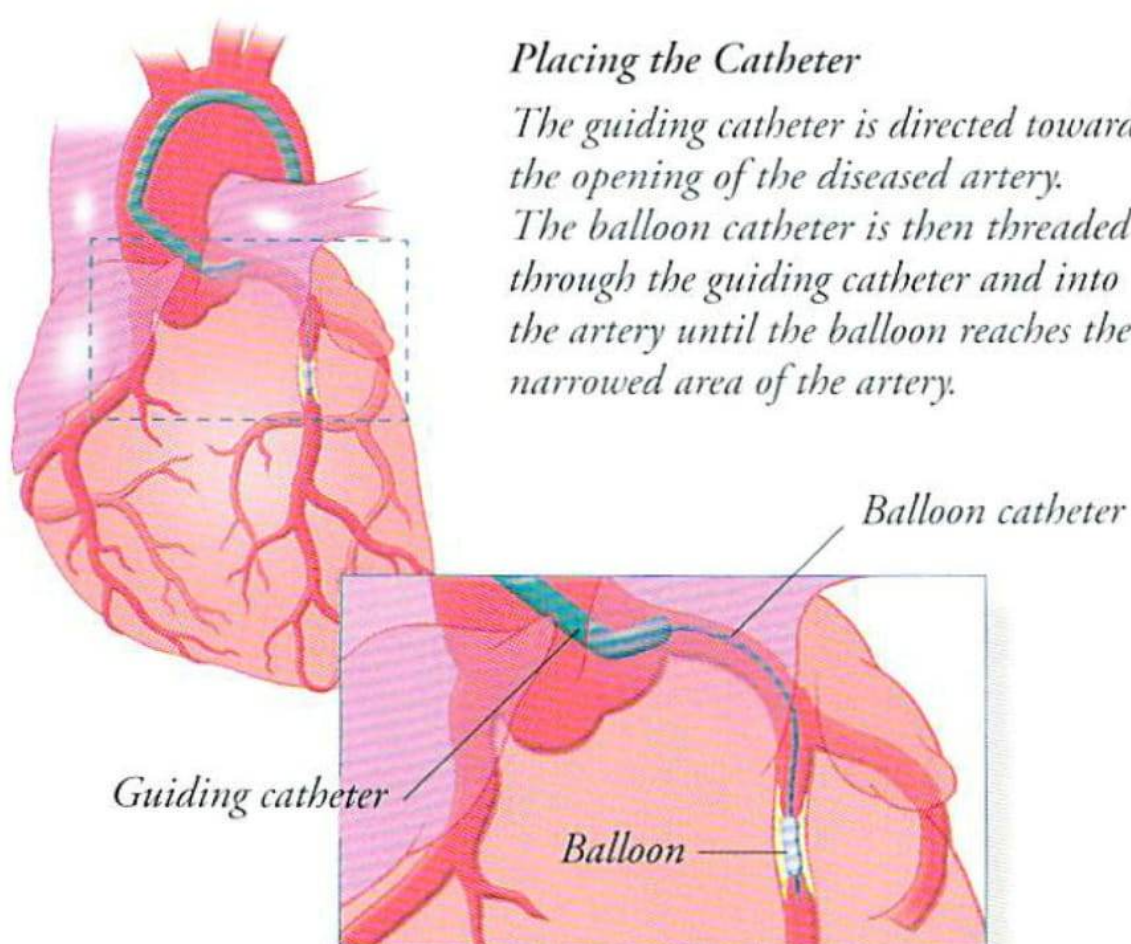
## Balloon Angioplasty

Based on the results of your cardiac catheterization, your doctor may decide to proceed with angioplasty immediately after the catheterization.

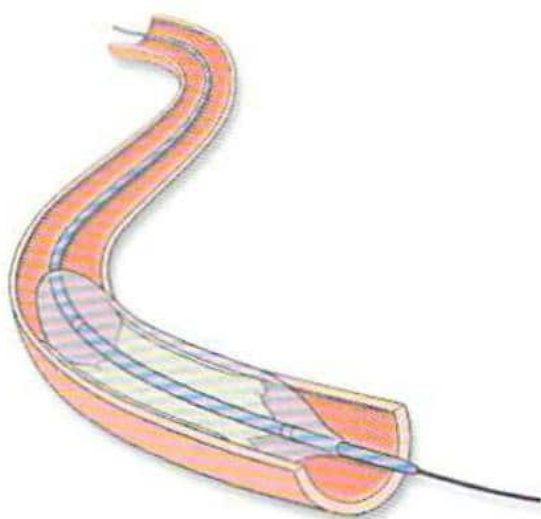
### How Is Angioplasty Done?

The sheath that was inserted in your artery during catheterization (see page 15) can be used for inserting additional catheters.

A **guiding catheter** (a long, flexible tube) is inserted through the sheath. The catheter is directed toward the opening of the diseased artery while the staff watches its progress on a television screen. Contrast is then injected into the artery to show exactly where the narrowed area or blockage is.



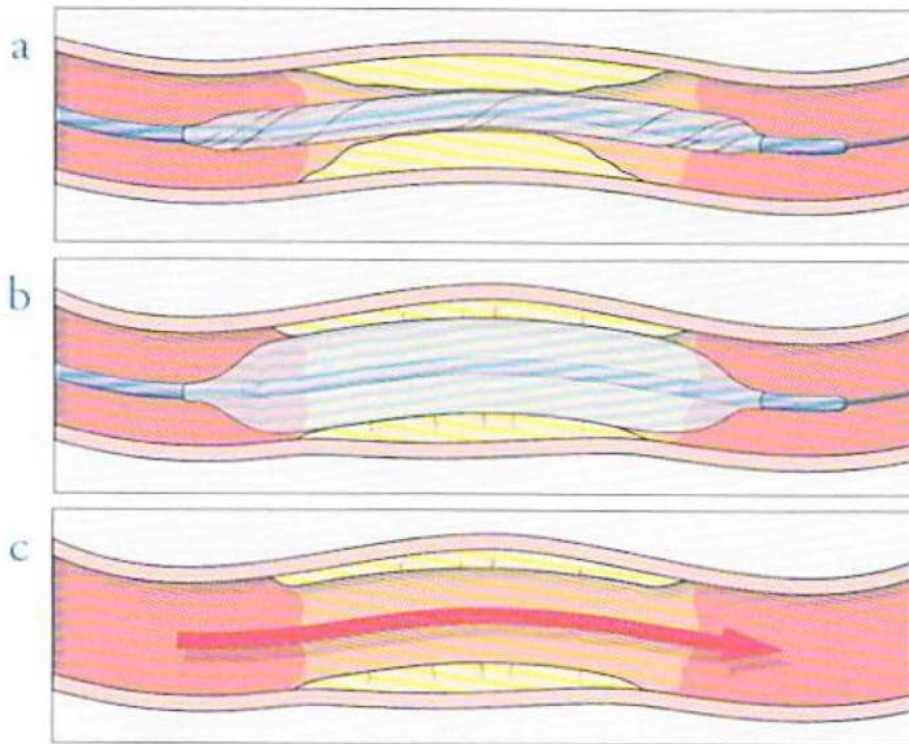




Next, a thinner **balloon catheter** is inserted through the guiding catheter. It has a small balloon at the tip that is used to open or widen the narrowed artery. The balloon catheter is threaded into the artery and placed across the narrowed area.

Once the catheter is in place, the balloon is inflated. This stretches the artery and flattens the plaque. The balloon is then deflated and removed. The larger opening in the artery allows more blood to flow through. Sometimes, the balloon has to be inflated several times to widen the artery.

When the balloon is inflated, it stops the blood from flowing through that coronary artery for a short period of time. As a result, you may feel some chest pain or discomfort when the balloon is inflated. This is normal.



*Opening the Artery. a) The balloon is placed across the narrowed area. b) The balloon is inflated, stretching the artery and flattening the plaque. c) The catheter is removed. The larger opening in the artery allows better blood flow.*

### **Is Angioplasty Safe?**

In most cases, angioplasty is successful and there are no significant problems. However, as with any other procedure that requires inserting a catheter *into* the body, there are some risks.

Minor, temporary complications may include nausea and vomiting, allergic skin rash, abnormal heart rhythms, infection, and bleeding at the insertion site.

More serious complications may include blood clots, damage to the heart or blood vessels, damage to the kidneys from the contrast, heart attack, and stroke. Death is rare.

One possible, serious complication is **abrupt closure** of the artery. Abrupt closure usually occurs within minutes or hours after the artery has been opened. It may be caused by a blood clot, spasm (tightening) of the artery, or a tear in the artery's wall. Abrupt closure can cause a heart attack.

If abrupt closure occurs, doctors may try to re-open the artery with a repeat angioplasty, or they may do emergency bypass surgery. To help prevent abrupt closure, doctors use a coronary stent (see page 26) and prescribe drugs that help prevent blood clots.

### **Preventing Blood Clots**

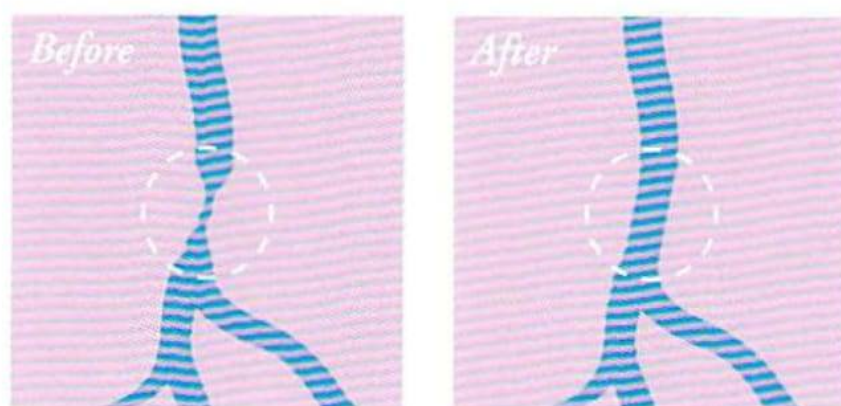
During the angioplasty procedure, you will receive powerful **anticoagulants** (“blood thinners”) and/or **antiplatelet drugs** through the IV line in your arm. These drugs help prevent blood clots from forming inside the artery, on the balloon, or on the stent.

Following the procedure, you may need to take antiplatelet drugs for several months to help keep the blood from clotting (see page 34).



## The Results

Angioplasty is “successful” when the narrowed artery can be opened wide enough to allow adequate blood flow, and no major complications occur. The success rate is generally better than 90 percent.



*Angiograms of a diseased coronary artery before and after a successful angioplasty.*

After a successful angioplasty, most patients are free of angina symptoms or have fewer symptoms. How much relief *you* get depends on how much the artery can be opened and whether other coronary arteries are also narrowed or blocked.

The success rate is generally lower in patients who are elderly, have diabetes, or have severe coronary heart disease. It is also lower during *emergency* angioplasty.

Sometimes angioplasty cannot open the artery. This may be the case, for example, when the artery is curved and the narrowed area is located beyond sharp bends in the vessel. In patients who have had heart disease for a long time, the plaque may have hardened so much that it cannot be flattened.

## The Artery May Narrow Again

Even when angioplasty is successful at first, the artery may narrow again. This problem is called **restenosis**. Restenosis is caused by the growth of new tissue that replaces injured tissue at the site where the artery was widened. On average, restenosis occurs in 30 to 40 percent of patients who have angioplasty alone.

Restenosis usually occurs within the first 6 months after an angioplasty. It may cause symptoms, such as chest pain or discomfort, that are very similar to the ones you had before your angioplasty.

If restenosis does occur, doctors may perform a repeat angioplasty and/or implant a coronary stent (see page 26). In some cases, coronary bypass surgery may be necessary.

To help *prevent* restenosis, doctors often implant a stent right after angioplasty.

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## Coronary Stents

A stent is a small device that is placed in an artery to help keep it open. It is a *permanent* implant that remains in the artery. By keeping the artery open, the stent improves the flow of blood and helps relieve symptoms of coronary heart disease.

A stent is usually implanted when there is a concern that the artery may close off after an angioplasty. Other times, a stent may be implanted to help reduce the chance of restenosis (see page 25). Most patients having angioplasty today also receive a stent.

### How Does a Stent Work?

Stents come in several designs. For example, a stent may look like a small metal coil, a slotted tube, or a mesh. A stent is usually less than an inch long, is as narrow as a piece of spaghetti, and weighs as little as a straight pin. A stent acts like a tiny metal scaffold that supports the artery's walls.



*Actual size of stent*



*Magnified view of stent*



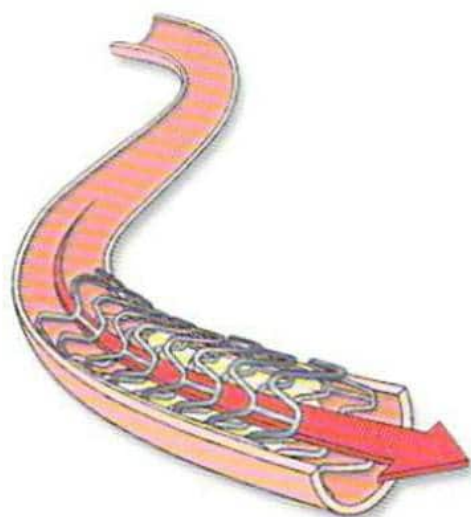
*Magnified view of expanded stent*



## How Is a Stent Implanted?

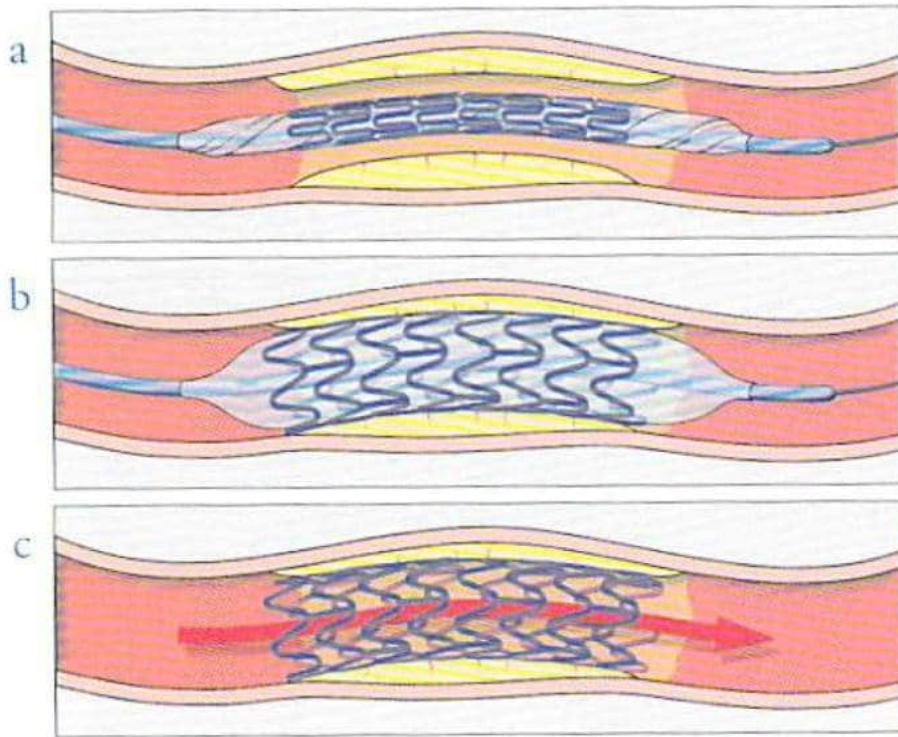
If a stent is needed, it is usually implanted right after angioplasty, before the sheath is removed.

The stent is usually mounted on a balloon catheter. It is threaded into the coronary artery and placed at the site where the artery was widened. When the balloon is inflated, the stent expands and presses against the inside wall of the artery. Another balloon may be used to fully expand the stent.



The balloon is then deflated and removed. The stent remains in place, helping to keep the artery open. One or more stents may be used in the artery to span the length of the area where the narrowing was.

The stent is a permanent implant that remains in the artery. Within a few weeks, a thin layer of tissue will slowly grow over the stent and cover it.

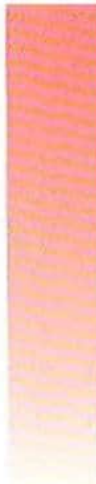


*Implanting a Stent. a) The stent is placed at the site where the artery was widened. b) The balloon is inflated and the stent expands. c) The balloon is then deflated and removed. The stent will remain in place, keeping the artery open.*

### **Possible Limitations**

During the first few weeks or months after a stent is implanted, blood clots may form and stick to the metal surfaces of the stent. This may cause the artery to close off and may result in a heart attack. To help prevent blood clots from forming, doctors prescribe antiplatelet drugs (see page 34).

Over time, a narrowing *within* the stent occurs in about 20 percent of newly implanted stents. This problem, called **in-stent restenosis**, is caused by the growth of too much tissue within the stent.



If in-stent restenosis does occur, doctors may perform a repeat angioplasty. In addition, new treatments are now available that can help prevent and/or treat in-stent restenosis.

### **Drug-Eluting Stents**

A drug-eluting (or coated) stent is a stent that has been covered with a special coating and a drug. The coating helps control the slow release of the drug into the wall of the artery. The drug helps reduce the growth of too much tissue in and around the stent, and therefore helps prevent in-stent restenosis.

Using drug-eluting stents has helped reduce the rate of in-stent restenosis to less than 10 percent.

### **Intracoronary Radiation Therapy**

During intracoronary radiation therapy, also called **brachytherapy**, a small dose of radiation is used to treat in-stent restenosis. The radiation is delivered to the artery by a wire, a balloon, or another source. The source is removed and does not stay in the body.

Intracoronary radiation therapy is used less now because, with the increased use of drug-eluting (coated) stents, in-stent restenosis occurs less often.



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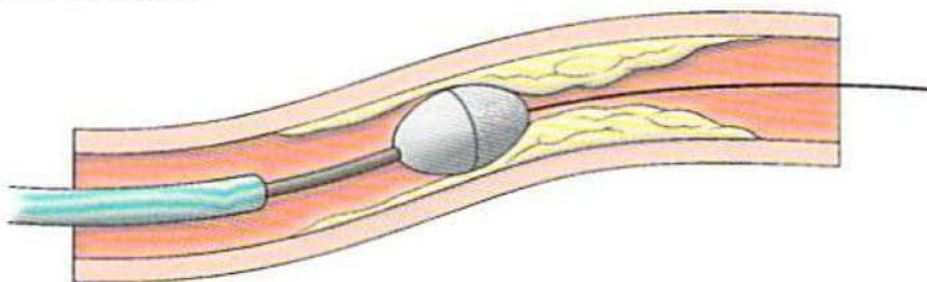
## Other Ways to Open Arteries

Balloon angioplasty is the technique used most often to open narrowed or blocked coronary arteries. In some cases, however, the plaque may be too “bulky” (large) or it may have hardened so much that it cannot be flattened by the balloon.

Doctors may use several other techniques, similar in many ways to balloon angioplasty, to open narrowed or blocked arteries. Instead of a balloon, the catheter has a different device at the tip, such as a tiny drill, a cutter, or a laser probe.

### ■ *Rotational Atherectomy*

During this procedure, a catheter with a special high-speed drill grinds away the plaque. The tiny particles ground from the plaque are then washed away in the bloodstream.

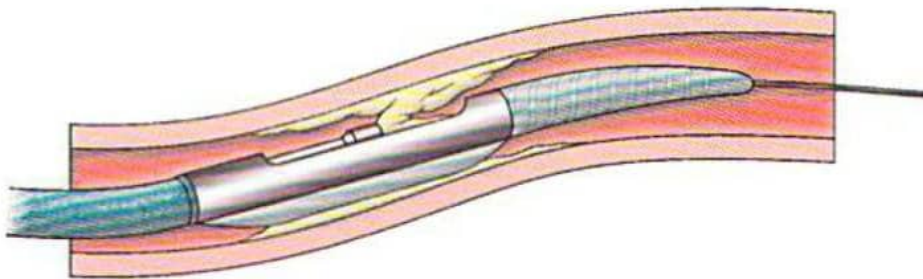


Rotational atherectomy is most useful for treating plaques that have hardened with calcium.

Once enough plaque has been removed (a process called “debulking”), doctors may decide to perform balloon angioplasty and/or implant a stent.

### ■ *Directional Atherectomy*

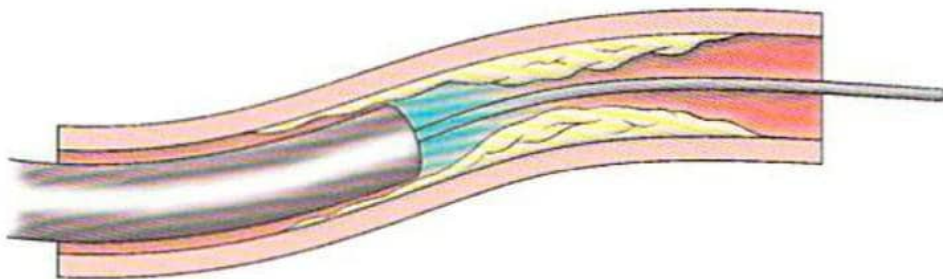
During this procedure, a catheter with a small cutting device (cutter) shaves off bits of plaque and stores them in a collection chamber. These bits are removed from the body when the catheter is withdrawn.



Directional atherectomy is most useful for treating bulky (large) plaques that are limited to one side of the artery's wall and have *not* hardened with calcium.

### ■ *Laser Angioplasty*

During laser angioplasty, doctors use a catheter with a fiber-optic tip, called a probe. An intense, highly concentrated beam of light passes through the catheter and heats the probe. The heat generated by the probe helps vaporize, or "burn away," the plaque.



Laser angioplasty can be useful for treating hardened plaques that cannot be treated with either balloon angioplasty or atherectomy.

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## After the Procedure

After the procedure, you will be taken to the recovery area or to a special care unit.

The sheath is usually left in place for several hours or overnight. This allows doctors to check the treated coronary artery.

If no problems occur, the sheath is removed and firm pressure is applied over the groin for about 20 to 30 minutes, to keep the site from bleeding. In some cases, doctors use a *compression device* (“clamp”) to apply pressure to the site. Other times, they use a *vascular closure device* to seal off the small hole left in the artery after the procedure.

After the sheath is removed, you will need to lie flat on your back for up to 6 hours, so that the site can begin to heal properly. During that time, do not bend or lift the leg where the catheters were inserted.

(If the catheters were inserted in your wrist or arm, or if a vascular closure device was used, you will be permitted to get out of bed sooner.)

The nurse will check your pulse and blood pressure often, and will also check the insertion site for bleeding. If you feel sudden pain at the site or if you notice bleeding, let the nurse know right away.

Most angioplasty patients go home within 24 hours after the procedure. Before leaving, you will be given instructions about medications, physical activity, and follow-up care. You should have a family member or a friend drive you home.



## After You Go Home

- **Limit your activity** during the first few days at home. You can move about, but do not strain or lift heavy objects.
- **A bruise or a small lump** under the skin at the insertion site is quite common. It should disappear within a few weeks.
- **Call your doctor** if the insertion site begins to bleed, the bruising or swelling increases, or the leg (or arm) in which the catheters were inserted feels cold or numb.
- **Call your doctor or nurse** if the insertion site becomes painful or warm to the touch, or you develop a temperature over 100°F.
- **Ask your doctor** when you can return to your normal activities, and whether there are activities you should not do.
- Be sure to **check with your doctor or nurse about medications**—which ones to keep taking and which ones to stop.
- **Call your doctor** if you notice worsening chest pain or discomfort, marked shortness of breath, or excessive fatigue with exertion. Any of these may signal a restenosis.
- **Do not have an MRI scan** within 3 months after your stent was implanted without first checking with your cardiologist.

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## Follow-Up Medical Care

You will be asked to see your doctor for follow-up visits to make sure you are recovering safely. You may also be scheduled for some diagnostic tests, such as a stress test or a heart scan. These tests help doctors determine whether the artery has remained open.

### Medications

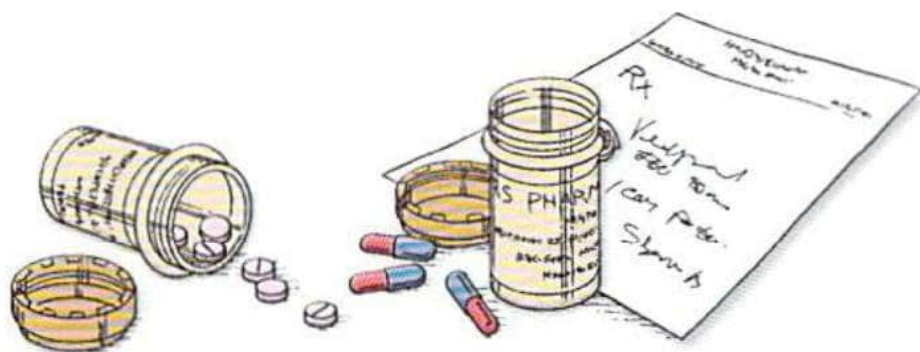
After the procedure, your doctor may prescribe one or more of the following medications.

#### ■ *Antiplatelet Drugs*

If you had a stent implant, your doctor will most likely prescribe antiplatelet drugs. Antiplatelet drugs make the platelets (tiny blood cells) less “sticky” and help prevent blood clots from forming on the newly implanted stent.

Doctors usually prescribe a combination of **aspirin** and **clopidogrel** (Plavix®). If a standard stent is implanted, anti-platelet drugs are usually prescribed for about a month. If a coated stent is implanted, they are prescribed for 3 to 6 months, or even longer. You will most likely be asked to continue taking a small daily dose of aspirin for the rest of your life.

**Important:** Never stop taking your antiplatelet drugs unless you are asked to do so by your cardiologist.





### ■ *Cholesterol-Lowering Drugs*

It is likely that your doctor will prescribe cholesterol-lowering drugs to help reduce your risk of a heart attack. The class of drugs most commonly prescribed are the **statins**.

### ■ *Beta Blockers*

Beta blockers slow down the heart rate, lower blood pressure, and reduce the workload on the heart. If you have had a heart attack, your doctor may prescribe beta blockers to help reduce your risk of another heart attack.

### ■ *ACE Inhibitors*

ACE inhibitors dilate (enlarge) blood vessels. This, in turn, lowers blood pressure and allows the heart to pump more efficiently. ACE inhibitors are most often prescribed for patients with weakened hearts.

## **If the Artery Narrows Again**

Most patients who have had a successful angioplasty have no further problems. In some cases, however, restenosis may occur (see page 25), usually within the first 6 months after the procedure.

If there is restenosis, your doctor may recommend a repeat angioplasty and a stent implant. Other catheter procedures, such as atherectomy (see pages 30-31), may also be used. In some cases, bypass surgery may be necessary.



## Changes in Your Lifestyle

You can help control your risk factors (see page 7) by changing your lifestyle. Doing so will help you get the most long-term benefit from your treatment.

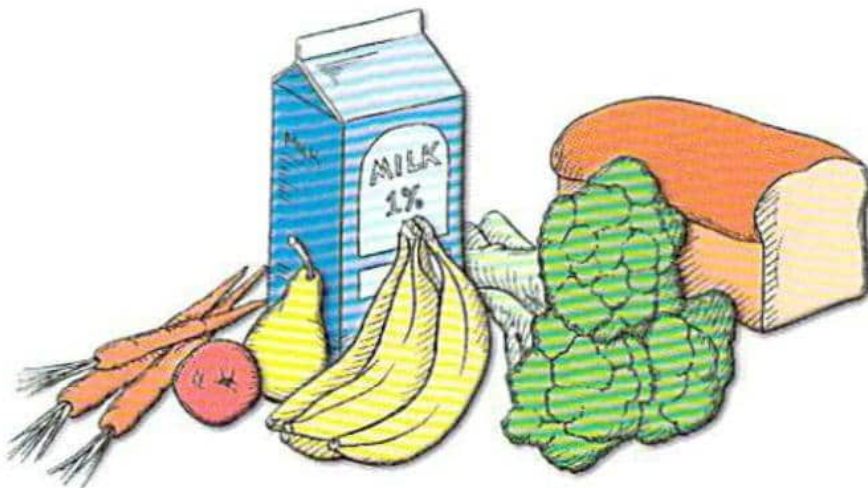
Among the risk factors you can control are high blood cholesterol, obesity, smoking, lack of exercise, high blood pressure, and diabetes.

### ■ *Enjoy a Heart-Healthy Diet*

A diet high in saturated fats and cholesterol can raise your blood cholesterol level. Excess cholesterol in the blood tends to build up on the walls of arteries and can lead to heart disease.

You can help lower your cholesterol level by changing the kind of foods you eat.

- Cut down on fat, especially saturated fats. Foods that contain a lot of saturated fats include fatty cuts of meat, butter, whole milk, cream, and cheese.
- Choose foods that are rich in starch and fiber, such as whole-grain breads and cereals, pasta and rice, dried beans and peas, and fresh fruits and vegetables.



- Choose low-fat dairy products, fish, chicken, and lean cuts of meat.
- Use cooking methods that need little or no fat, such as steaming, baking, broiling, and grilling. Trim off all visible fat before cooking meat. Remove the skin before cooking chicken.

### ■ *Lose Weight and Keep It Off*

The healthy way to lose weight is to eat a variety of nutritious, low-fat foods and go easy on high-calorie items (such as snacks, pastries, desserts, and fatty cuts of meat). Another way to lose weight is to eat smaller portions of all foods in your diet.

A sensible program of exercise, preferably every day, should also be part of your weight-loss program.

### ■ *If You Smoke—Quit!*

People who smoke have more than twice the risk of having a heart attack than those who do not smoke. In addition, smoking is the leading cause of chronic lung disease and lung cancer.

If you have not been able to stop smoking on your own, you may want to join a smoking-cessation program. You'll be given brochures, audio tapes, and kits that will assist you in quitting. Prescription and over-the-counter medications are available, too.

### ■ *Exercise Regularly*


Regular exercise strengthens your heart muscle and helps the heart and lungs use oxygen more efficiently. It also helps control blood pressure, and it helps you lose weight and reduce stress and tension.

To benefit your heart, you should exercise for 30 to 60 minutes, preferably every day, or at least 5 times a week. Be sure to consult your doctor before starting an exercise program, especially if you are over 40, not accustomed to vigorous activity, or have health problems that may increase your risk.



Types of exercise that are good for the heart include brisk walking, jogging, swimming, bicycling, singles tennis, aerobic workouts, and dancing.





■ *Watch Your Blood Pressure*

If your blood pressure is high, there are several steps you can take to help lower it: cut down on salt, lose excess weight and keep it off, exercise regularly, learn to relax, and if you smoke—quit.

If your blood pressure remains too high, your doctor may start you on medication. Take medications as directed, and keep taking them even if you feel well.

■ *Control Diabetes*

If you have diabetes, do your best to keep your blood sugar levels within the normal range. Pay careful attention to your diet and take medications properly. Exercise regularly to help reduce both your weight and the amount of insulin you need.

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Making these changes in your lifestyle and following your doctor's instructions are essential for getting the most long-term benefit from your treatment.

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