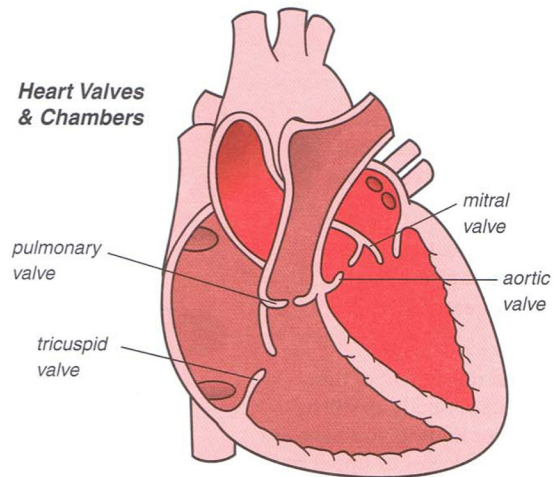
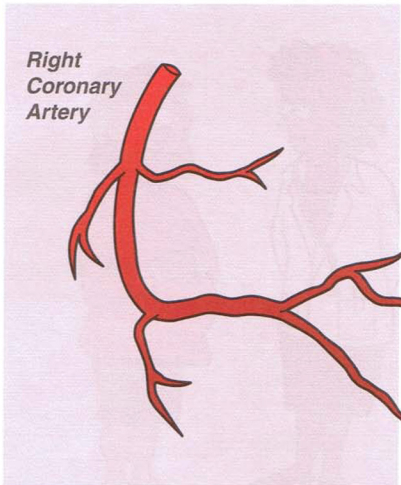


**Heart Valves
& Chambers**

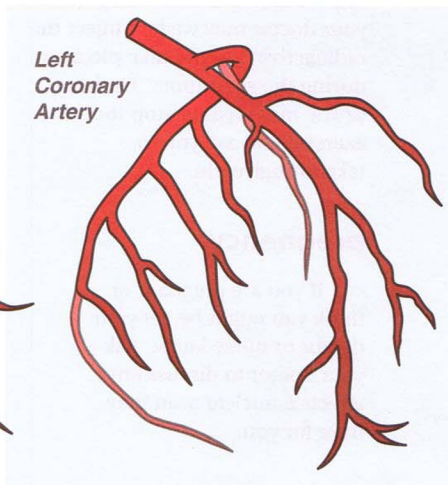


Your doctor may wish to use these drawings to show you any blockages.

**Right
Coronary
Artery**



**Left
Coronary
Artery**

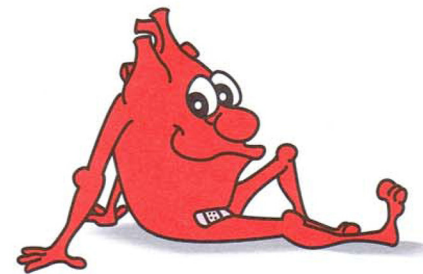


Cardiac Catheterization

and other cardiac diagnostic tests and radiological procedures

by

Julia Ann Purcell, RN, MN, FAAN



This book should not replace the advice or treatment your doctor gives you. It is only to add to what you are now learning about cardiac catheterization (a heart cath).

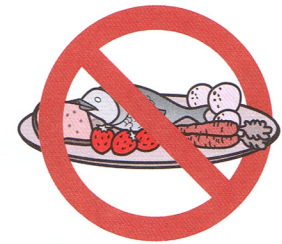
Contents

A heart cath	4
At the hospital	6
Getting ready for cardiac cath	8
The cath lab	9
The catheter and dye	12
After the cath	14
Getting out of bed	18
Results	19
Going home	20
Treatment	21-25
Medicines	21
Changes in lifestyle	23
Coronary angioplasty	24
Bypass surgery	25
Other tests	26-31
ECG (electrocardiogram)	26
Exercise stress test	27
Echo (echocardiogram)	29
Nuclear scan	30



Your doctor can use the drawings on page 32 to explain your heart cath and the results.

You will be asked to limit or delay eating and drinking until the scan is finished. Your doctor may also ask that you not take certain medicines before the test.



Sometimes exercise on a treadmill or bike is part of the test. **If exercise is part of your scan, wear socks or shoes** for easier pedaling or walking.



As the camera scans the movement of the radioactive dye, keep your upper body as still as you can. Also, **let your doctor know if you have any feelings in the chest, arms, neck, jaw or upper back that feel strange to you** (even if they do not seem important). If these feelings occur, your doctor may wish to inject the radioactive dye and take pictures during the symptoms. Or, he or she may wish to stop the exercise and ask you to take nitroglycerin.

pregnancy

If you are pregnant or think you might be, let your doctor or nurse know. Ask your doctor to discuss any effects a nuclear scan may have for you.

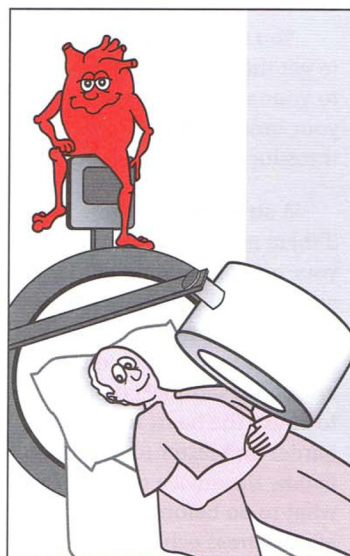


Nuclear scan

A cardiac nuclear scan is a type of X ray. In this test, a small amount of radioactive dye is injected into a vein. These scans include:

- ▶ **Thallium scan**
- ▶ **PET scan** (positive emission tomography)
- ▶ **First pass or Technetium scan**
- ▶ **MUGA scan** (multiple gated acquisition)

Often in a nuclear scan, a needle is put in an arm vein, and sticky ECG pads are put on the upper chest. Radioactive dye is injected through the needle. (Some nuclear scans involve a number of these injections.) The dye moves through the heart chambers and/or heart muscle while a scanning camera records pictures of the heart. Total exposure to radiation is limited (less than with a chest X ray).



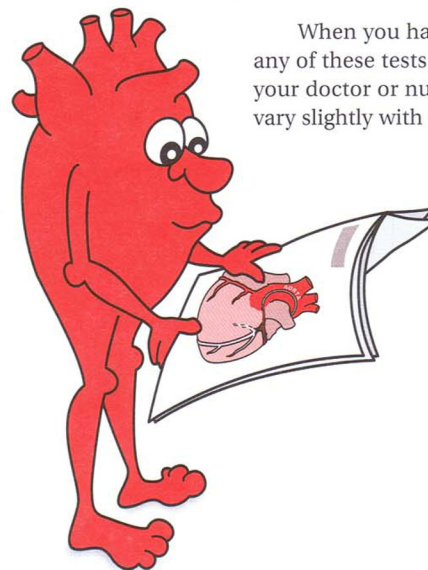
Welcome

This book takes you step-by-step through cardiac catheterization. After reading it, you will know what it is like to have a heart cath and what to expect. Knowing this ahead of time can help you feel less anxious.

A cardiac cath is not surgery. It is a dye test that shows you and your doctor the condition of your heart's chambers and coronary arteries.

Other tests are often done before a cath. They include: an ECG (EKG), treadmill or stress test, echocardiogram or sometimes a nuclear scan. Each is briefly explained on pages 26–31.

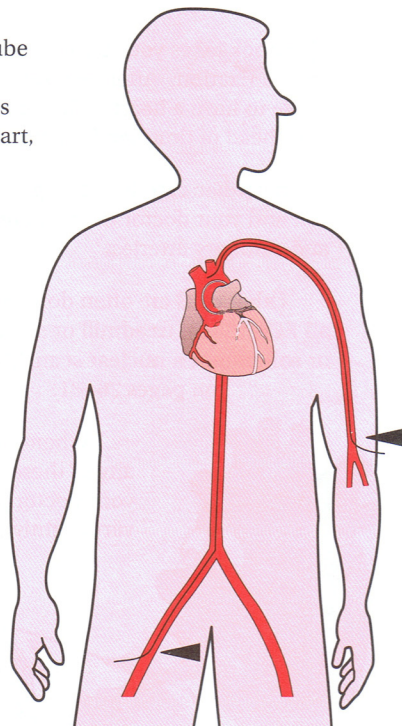
When you have questions about any of these tests or procedures, ask your doctor or nurse. The routine will vary slightly with each hospital.



A heart cath

Cardiac catheterization* is when a tube (catheter) is put in an artery and/or vein and moved along until it reaches the heart. Once the tube is in the heart, x-ray dye is injected.

A heart cath is done to see if there are problems in the heart valves, chambers or main blood vessels (aorta or pulmonary artery). It is also done to see if there is fatty buildup (atherosclerosis) in the heart arteries.



Ask your doctor which blood vessel(s) will be used for your cath.

*Other terms used to describe cardiac catheterization are *coronary arteriogram*, *coronary angiogram* or *dye study of the heart*.

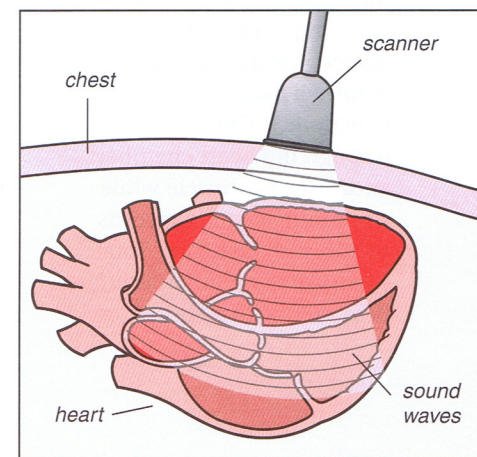
Echo (echocardiogram) or stress Echo

The Echo uses sound waves to look at your heart's size and how the chambers and valves are working. It can be used to check on abnormal openings between chambers and fluid in the sac around the heart.

Having an Echo is much like having an ECG. It does not hurt and takes about 20 to 30 minutes. You remove upper body clothes and stockings and lie quietly on a table or bed. A technician moves a scanner (transducer) over your chest, taking pictures and recording them on video.

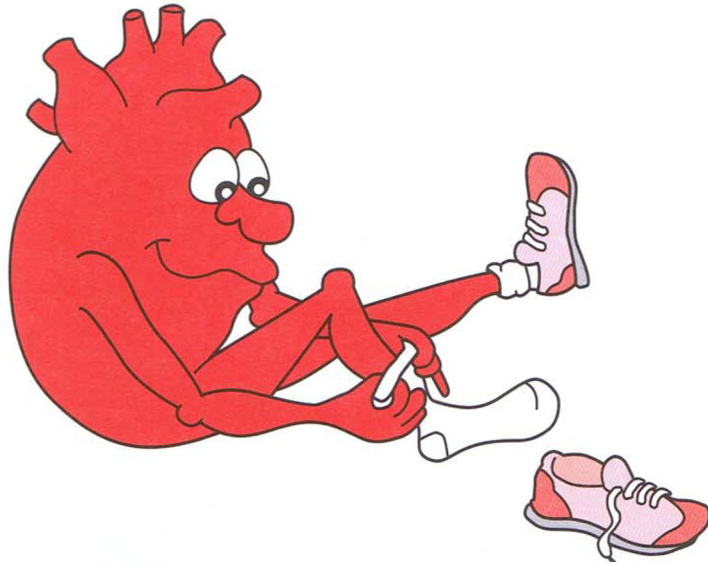
You must lie quietly so that the transducer can be placed to get the exact angles needed. You may be asked to turn to your side or briefly hold your breath while the best transducer position is found.

A **stress echo** is done to see if there are any problems when your heart is beating harder and faster. Some patients exercise on a treadmill. Others get an IV medicine to dilate an artery (Persantine®) or a drug to cause the heart to work harder and faster (dobutamine). Follow the advice on p. 28 for what to do before, during and after a stress echo.



BEFORE having the stress test:

- ▶ Do not eat heavy foods or drink a lot of liquids. These could cause stomach cramps or vomiting.
- ▶ Wear comfortable clothes (pants/skirt that opens down the front) and good walking shoes.

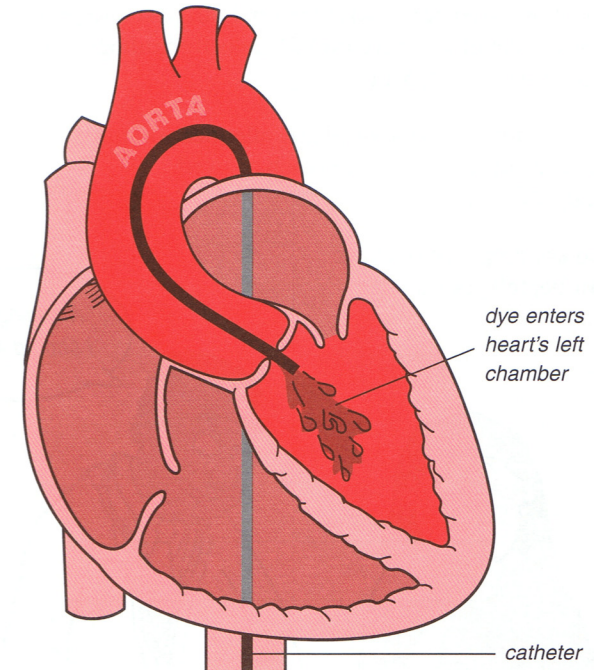


DURING this test, it is important to let the doctor or nurse know if you feel:

- ▶ any chest, arm, jaw or back discomfort
- ▶ severe fatigue

At home, if any skin irritation occurs where the ECG pads were placed, keep the places dry. Don't scratch. If the irritation is severe, call your doctor for advice.

During a cardiac cath, pressure readings are made inside the heart. Also, moving pictures are taken of one or more of the heart chambers and coronary arteries. These arteries carry blood to the heart muscle. The total heart cath lasts about an hour.



Often a cardiac cath shows that the heart and major blood vessels are normal. But when problems are found, plans for treatment can be made.

At the hospital

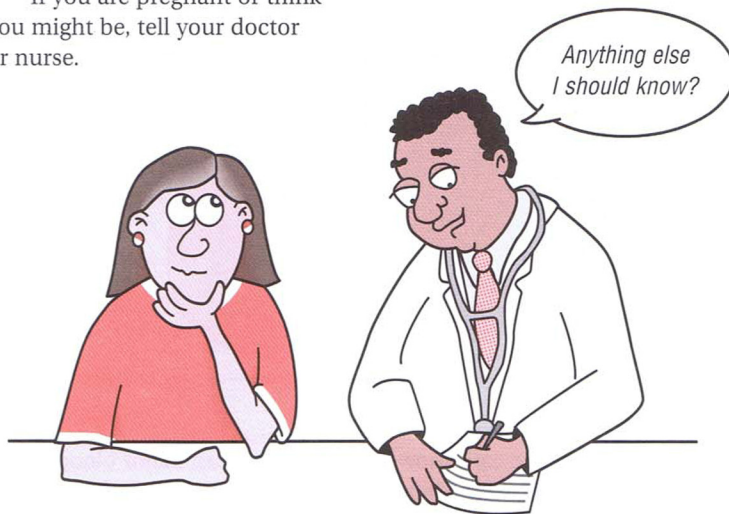
Some people have a cardiac cath during a hospital stay. Most of the time, a heart cath is done while you are an outpatient. Here's what to expect.

Medical history & tests

You will be asked about your health, both past and present. You will also have blood tests, an ECG (electrocardiogram) and, sometimes, a chest X ray.

Be sure to tell your doctor of any allergies you have to foods, medicines or x-ray dye (such as used with kidney X rays).

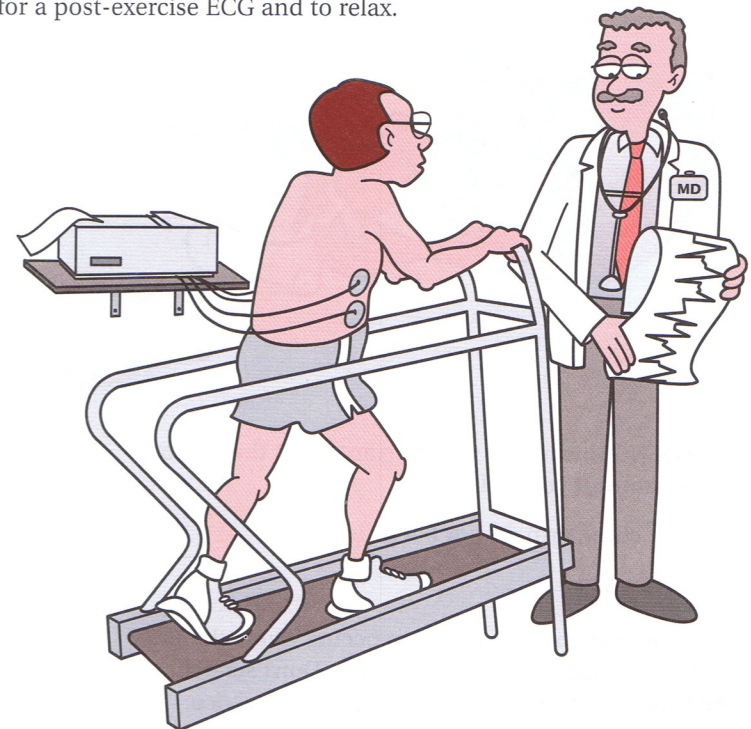
If you are pregnant or think you might be, tell your doctor or nurse.



Exercise stress test

An exercise ECG (stress test) is a test done while you are walking on a moving belt (treadmill) or riding a stationary bike. During the test you are connected by ECG pads to a machine that records the heart's electrical activity. As you exercise, the doctor watches for changes in the ECG. Changes in the ECG pattern during exercise may mean heart problems.

After the stress test, you return to a table for a post-exercise ECG and to relax.



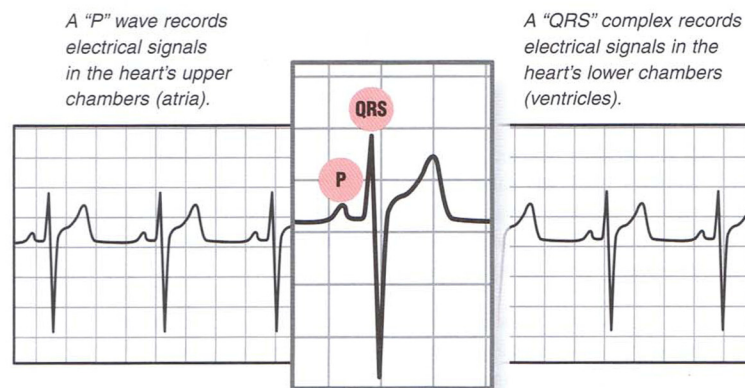
Other tests

You may also have one or more of these tests before your heart cath:

ECG (electrocardiogram)

This test records the electrical impulses moving through the heart muscle. The ECG can show abnormal heartbeats (arrhythmias or dysrhythmias) and any damage or enlargement in the heart muscle. (These problems can also occur without changes on an ECG.)

An ECG does not hurt and lasts only 5 to 10 minutes. You are asked to remove stockings or socks and upper body clothes. Small metal plates or cups are placed on your chest, arms and legs, and you are asked to lie quietly. If you move or talk, it is harder to record the heart's electrical signals.



Medicines

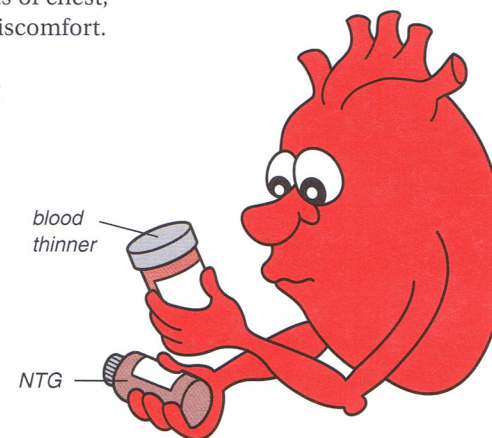
You will need to know the name and dosage of your medicines. Take your medicine bottles or a current list of them with you to the hospital.

► anticoagulants (blood thinner)

If you are taking a blood thinner (Coumadin®) to prevent clots, it will most likely be stopped. Sometimes medicine to reverse the effect is needed.

► nitroglycerin (NTG)

Always let the nurse know if you have any symptoms of chest, arm, neck or jaw discomfort. If you have NTG, be sure to tell your nurse when taking it for any of these symptoms while at the hospital.



Getting ready for cardiac cath

Clip & scrub

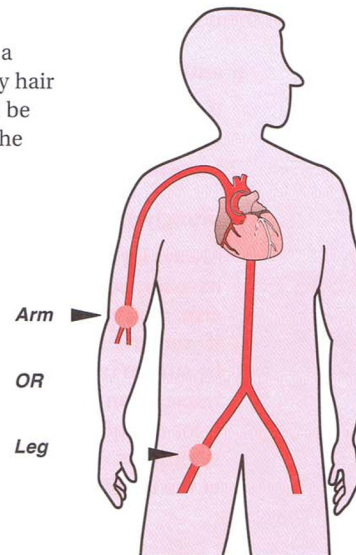
The catheter(s) will be inserted into a blood vessel in your leg and/or arm. Any hair around the place where the catheter will be put in is shaved or clipped away. Then the skin is scrubbed with a special soap.

No food or drink (NPO)

Do not eat or drink anything for a number of hours before the cath. This lowers the chance of nausea or vomiting during the procedure. After the cath, you can have food and liquids as you like.

The bare essentials

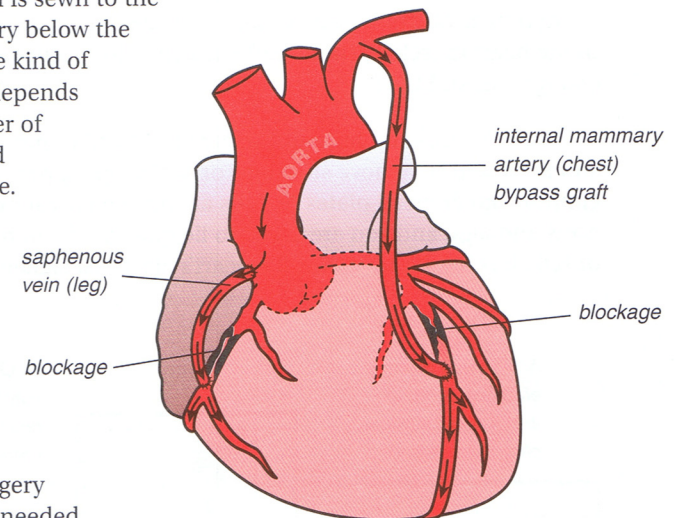
You will most likely wear a hospital gown for the cath. Before leaving your room, you will be asked to go to the bathroom and to leave behind slippers, clothing and jewelry. Metal around your neck would get in the way of the x-ray pictures. A nurse will tell you if you should not wear your eyeglasses, rings, watches or dentures. What you can wear to the lab varies from place to place.



Ask your doctor which blood vessel(s) will be used for your cath.

Bypass surgery

This surgery is advised for some people with blockages of the heart arteries. A leg vein or an artery from the chest (internal mammary) is used for the bypass graft. When a leg vein is used, one end is sewn to the aorta (main blood vessel) and the other end to the coronary artery just below the blockage. When a chest artery is used, one end is left attached to a branch of the aorta. The other end is sewn to the coronary artery below the blockage. The kind of bypass graft depends on the number of blockages and where they are.



Heart surgery is sometimes needed to replace a heart valve which has become scarred. Often scarring is the result of an infection. Many years may pass before enough scarring occurs to need heart surgery.

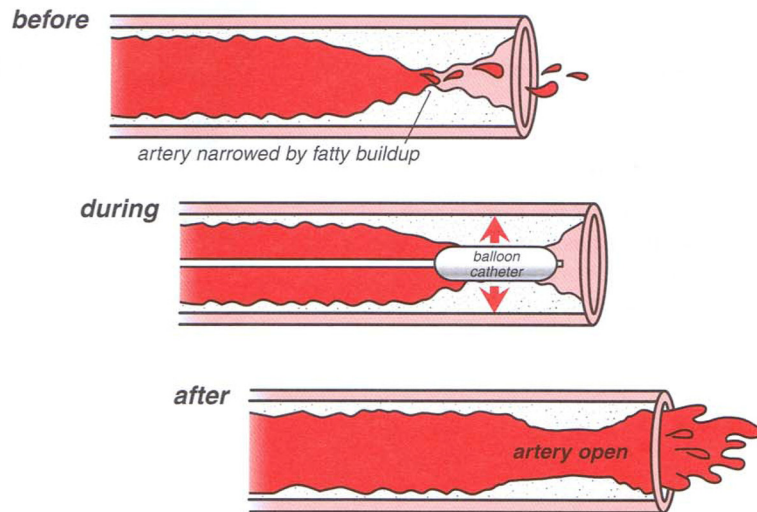
Other problems in the valves, heart chambers or major blood vessels can be present at birth and require surgery in childhood or later as an adult.

Coronary angioplasty

The goal of angioplasty is to open the artery and improve blood flow.

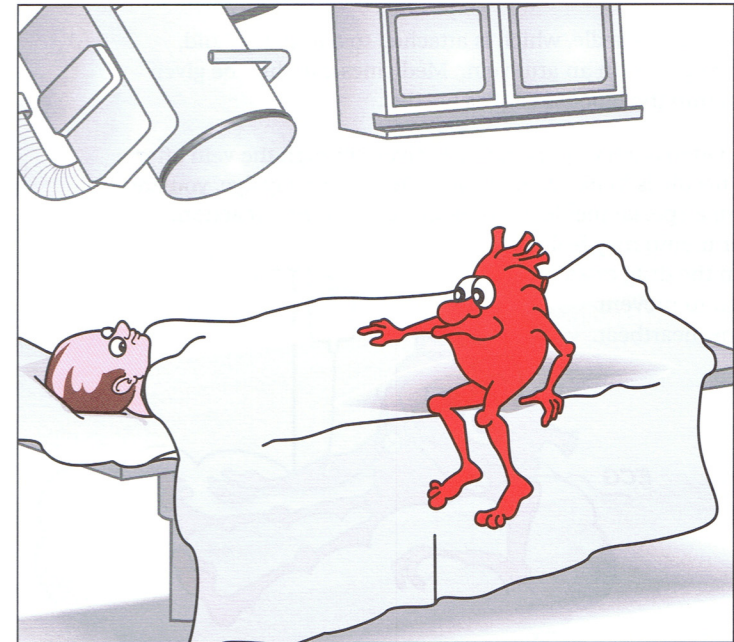
Getting ready for angioplasty is much like getting ready for cardiac cath. A tube (catheter) with a balloon on the tip is passed into the narrowed artery and inflated briefly to flatten the buildup against the artery wall. Sometimes other catheters are used to remove the fatty buildup (atherectomy or laser). Sometimes a stainless steel coil or wire mesh (stent) is used to prop the artery open.

This treatment is not suited for all coronary artery blockages. Your doctor will advise you if angioplasty or bypass surgery is needed for any blockages in your coronary arteries.



The cath lab

When you get to the lab, you will lie on a bed under an x-ray camera. In most labs, the camera moves on an arm over the bed. You will see TV screens nearby.



ECG (electrocardiogram)

Sticky pads (electrodes) will be placed on the side of your chest. These monitor your heartbeat. You may also be able to see your ECG or the pictures as they are taken of the heart and arteries. Sometimes you can hear a beeping sound with each heartbeat.

Medicines

A small needle, which is attached to a bottle of fluid, will be placed in an arm vein. Medicines can then be given right into the bloodstream as needed.

Often a relaxing medicine is given through the vein after the needle is in place. If you are allergic to x-ray dye, you are given a special medicine to reduce or prevent a reaction. Your mouth may feel dry from the drug often given to prevent a slow heartbeat.



Changes in lifestyle

The exact causes of fatty buildup in the arteries (atherosclerosis) are not known. But there are some risks that make a person more likely to have buildup in the arteries. For this reason, most doctors will ask that you:

- ▶ quit smoking
- ▶ lower blood pressure (if high)
- ▶ eat less saturated fat and cholesterol
- ▶ exercise (Your doctor will tell you what kind and how much.)
- ▶ lose weight (if you are overweight)
- ▶ reduce tension and stress



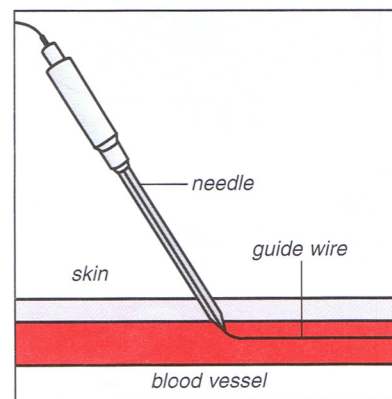
Changes in activity

Sometimes the cardiac cath shows there has been recent heart damage or an overall heart weakness. If so, limits in activity may be needed for a time so healing can take place. Your doctor will let you know which activities to avoid.

An illustration of medical supplies. It features a brown glass bottle with a white label, a clear plastic bottle filled with white capsules, and several individual pills (capsules and tablets) scattered in the foreground.

[illegible]

The catheter may be inserted in an artery or vein in the groin or arm.* The skin over the chosen blood vessel will be numbed with medicine. Your skin may burn or sting as the medicine is injected. When the skin is numb, a needle is placed in the artery or vein. You may feel some pressure when this is done, but pain is not likely. Once the tip of the needle is in the blood vessel, a guide wire is moved through the needle into the artery or vein.



22

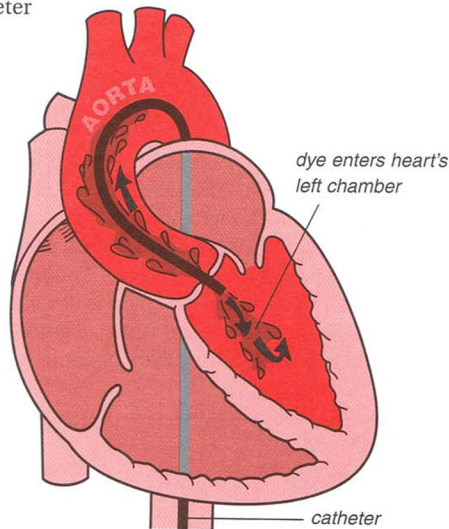
The catheter and dye

The catheter is a long, very thin tube. There should be no pain as the catheter passes over the guide wire to the heart. **Blood vessels do not have pain fibers.**

Most of the time, the catheter is first placed in the left heart pumping chamber, and x-ray dye is injected. Moving pictures are made as the heart squeezes the dye into the main blood vessel (aorta).

You will have a warm or hot feeling throughout your body for 30 seconds or less. Some people also have slight nausea or extra heartbeats. These feelings should pass quickly and not come back.

If the TV screen is nearby, you may be able to watch your doctor guide the catheter into place in your heart. Most of the time, the lights are dimmed during the cath to make the screen clearer.



Treatment

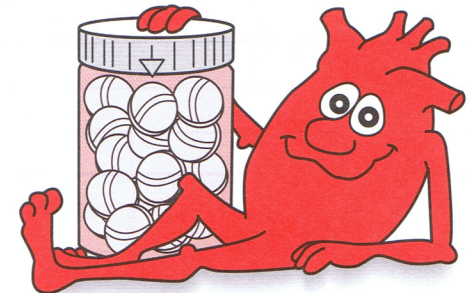
Some of the treatments for heart problems include:

- ▶ medicines
- ▶ changes in lifestyle
- ▶ angioplasty
- ▶ surgery

Medicines

Heart medicines may be prescribed to:

- ▶ reduce blood cholesterol levels and slow fatty buildup in the arteries
- ▶ relax the blood vessels
- ▶ produce a slow, steady heartbeat
- ▶ make the pumping action of the heart stronger
- ▶ take excess fluid from the blood
- ▶ replace minerals (potassium)



Going home

Before you go home, the pressure bandage is replaced with a Band-Aid®. Unless hospital treatment is needed right away, most people go home the day of the cath. Fatigue is common for a day or two. Also, you may have a bruise and/or a small lump at the site where the catheter was put in.

Activity

You can return to your normal routine unless your doctor tells you to avoid certain things until further treatment.

Shower

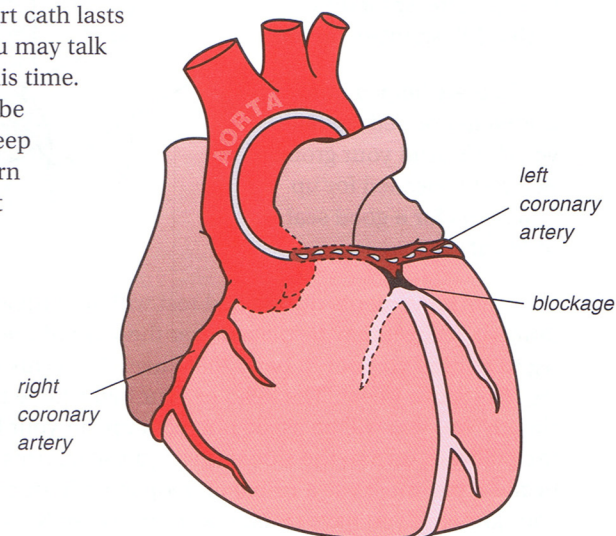
The doctor will tell you when it's OK to take a shower or bath. If a leg artery was used, showers are often allowed after 24 to 36 hours. Most of the time, stitches are not needed in the leg artery or on the skin.

If an arm artery was used, you should protect the site with a plastic cover when taking a shower or bath. Do this until the stitches have been removed (6 to 10 days later in your doctor's office).

After pictures of the pumping chamber are made, the catheter is placed in each of the coronary artery openings. Smaller amounts of dye are pumped into the arteries a number of times. Moving pictures then record the flow of dye into the smaller branches.

When the pictures have been developed and studied, your doctor can see if any of the heart's arteries are blocked*. If so, these arteries will not fill with dye. If an artery is prone to spasm, injection of the dye sometimes allows the doctor to see the spasm happen.

The total heart cath lasts about 1 hour. You may talk during most of this time. At times you will be asked to take a deep breath, cough, turn to one side or not speak for a few minutes while pressures are being measured.



*with fatty buildup (atherosclerosis) and/or clot (coronary thrombosis)

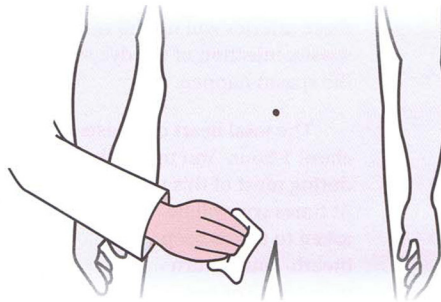
After the cath

When the x-ray pictures have been taken, the catheter is removed.

Leg artery

If the groin artery was used, firm pressure is applied to the site for 10 to 20 minutes. Pressure helps a seal form over the puncture in the artery. Then a large bandage is placed over the site, sometimes with a 5 lb sandbag on top.

You are helped onto a stretcher or bed so that you don't bend your groin. Bed rest is needed for up to 6 hours for a good seal to form.*

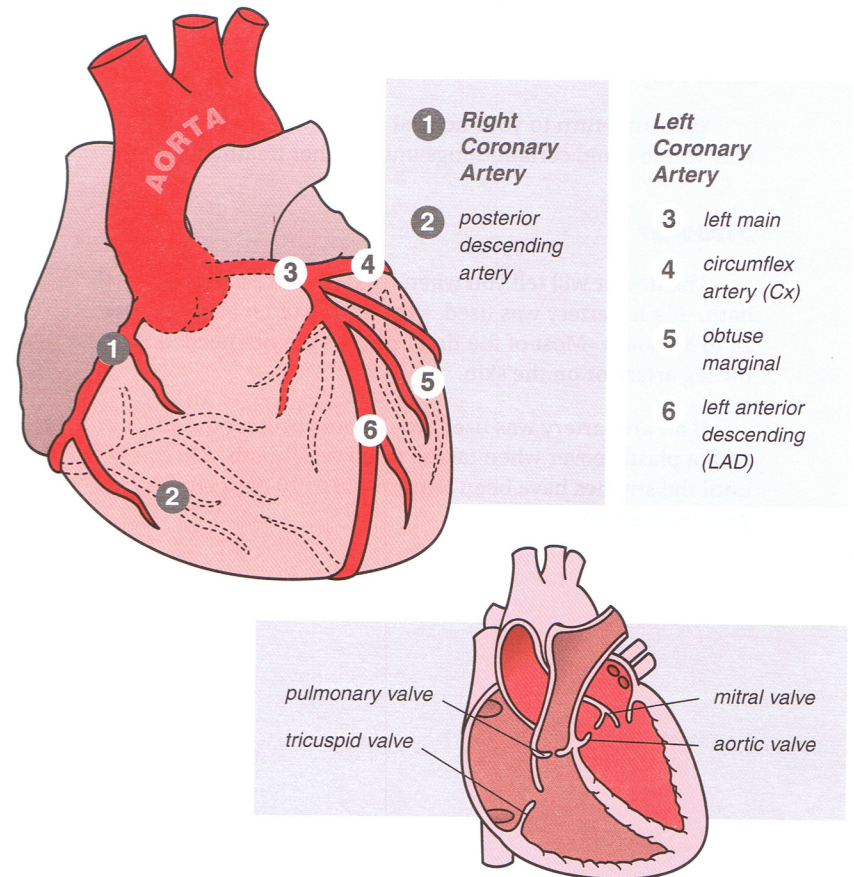


Your movements during bed rest will be somewhat limited. A sheet may be placed over the knee of the affected leg to remind you not to bend that knee. The arms and other leg may move freely. The head of your bed will be raised slightly, but you will be asked not to sit up, lift your head off the pillow or turn to the side until a tight seal forms. When needed, you must use a urinal or bedpan without bending your groin. If you have trouble with this when lying down, tell your nurse.

*If a small catheter can be used, only 3 to 4 hours of bed rest may be needed for a seal to form in the artery.

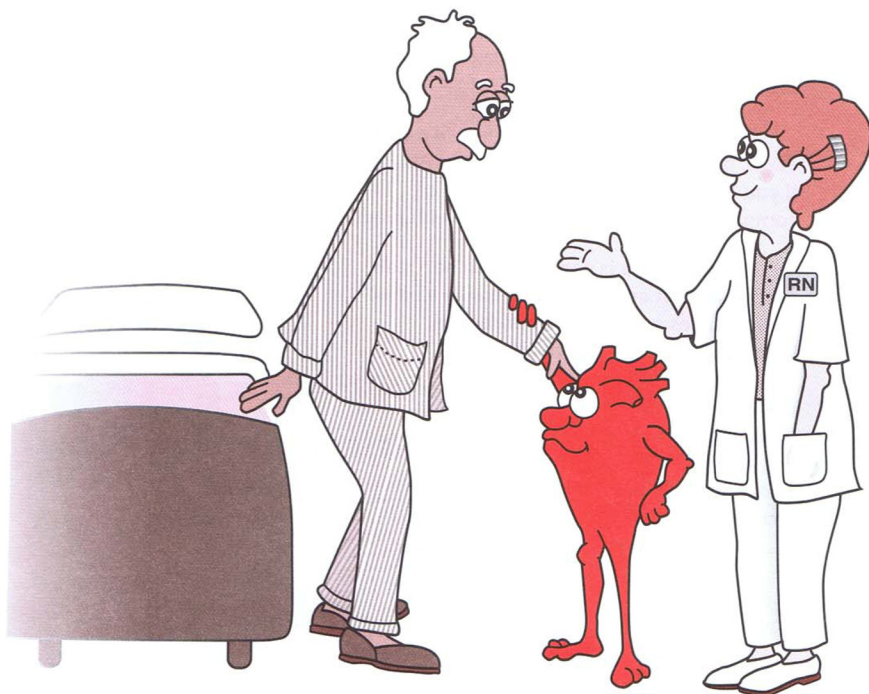
Results

Many times a heart cath shows that the heart and blood vessels are normal. But if the cath shows that there is a problem, your doctor can use these drawings (or those on p. 32) to show you what can be done about it.



Getting out of bed

Your doctor will most likely let you get out of bed late in the evening of the day of the heart cath. When you first get up, a nurse should be present in case dizziness or bleeding occurs. Outpatients can go home once they can walk around the room with no weakness or bleeding from the groin site.

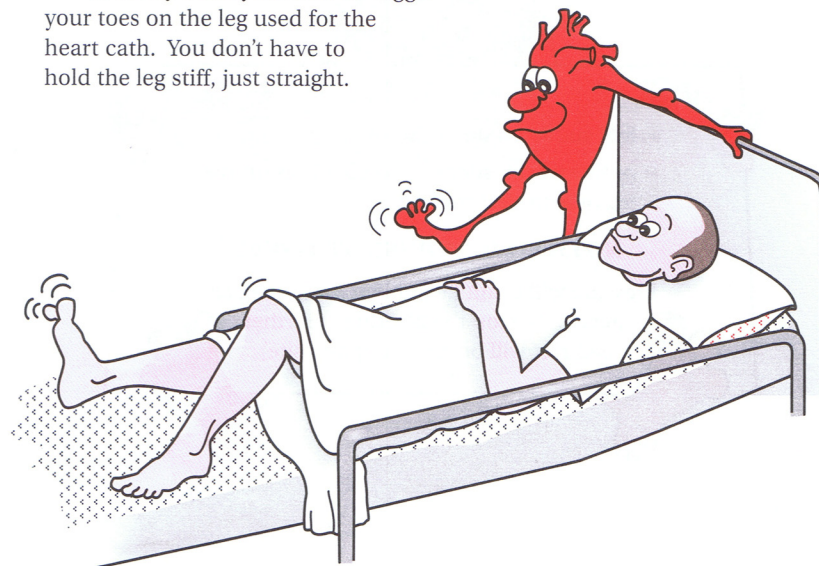


If you have to cough or sneeze, put your hand over the pressure bandage, and hold it firmly. Your family or a nurse can help you cut up foods to make them easier to eat while you are lying down.

You may have **back discomfort** during the bed rest. It can be eased by:

- ▶ bending the knee of the unaffected leg often
- ▶ a small towel or pillow under the back and/or a back massage (by nurse)
- ▶ mild pain medicine (such as Tylenol®)

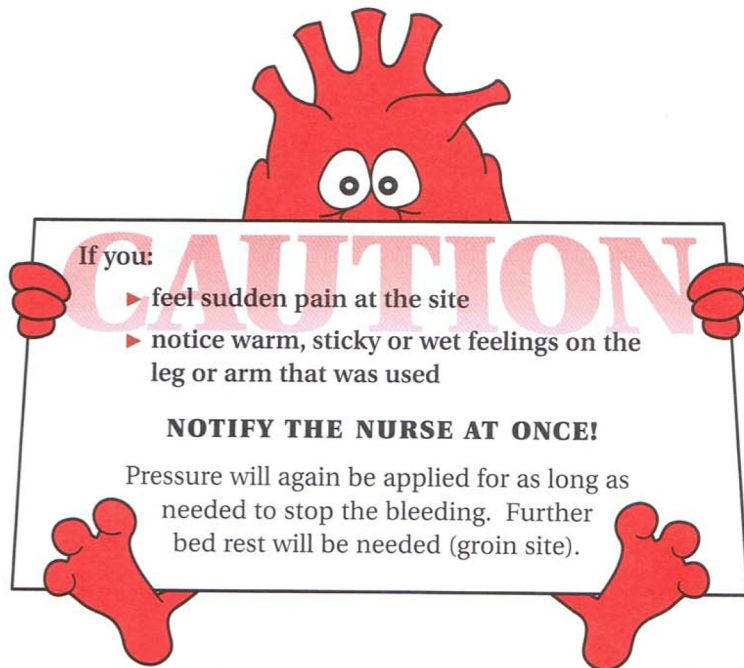
You may bend your foot or wiggle your toes on the leg used for the heart cath. You don't have to hold the leg stiff, just straight.



Arm artery incision

If the arm artery or vein was used, a few stitches may be needed in the blood vessel and skin after the catheter is removed. This takes about 15 to 30 minutes more after the cath is over.

Do not bend the arm sharply for a number of hours, and do not lift anything heavy until the soreness is completely gone. You may walk to the bathroom (with help at first) and around in your room as you feel like it.



Other things to know

After the cath, a nurse will check your vital signs often. The nurse will also check the pulses in your foot or arm and check your bandage for bleeding. (Bleeding rarely occurs.)

You may feel **drowsy** as the medicine given during the heart cath continues to work. Also, it is normal to feel soreness at the puncture site as the “numbing” wears off.

Your body gets rid of the dye used during the cath through your kidneys, making extra urine. Most people are asked to drink more fluids after the cath.

During your stay, **tell the nurse of any discomfort** in your chest, neck, jaw, arms or upper back. Also let your nurse know if you feel short of breath, weak or dizzy. These are not common, and they may be relieved with medicines.

A cardiac cath is considered to be a safe procedure, but any work done inside a blood vessel carries a small risk of problems. These include bleeding, heart attack or stroke. Your doctor will discuss any risks that cardiac cath might hold for you and ask you to sign a consent.

