Understanding Angioplasty and Stenting

- Coronary Artery Disease
- Angioplasty and Stenting Procedures
- Risk Factor Management
Help for Heart Problems

You have been given this booklet because you have symptoms or signs of coronary artery disease, or CAD. This is a serious condition that involves narrowing of the blood vessels that feed the heart. It can lead to a heart attack or sudden death. The good news is that this disease can be treated. Two procedures, angioplasty and stenting, can help restore normal blood flow to the heart muscle. Afterward, managing the risk factors for heart disease can help you stay healthier and more active.

Risk Factors for Heart Disease

Risk factors are health problems and lifestyle factors that increase a person’s chance of developing heart disease. Your health history, exam, and test results show which risk factors you have. And your risk factors will shape your treatment plan. Major risk factors include:

- Abnormal blood cholesterol (dyslipidemia)
- High blood pressure (hypertension)
- Smoking and other forms of tobacco use
- Diabetes
- Being overweight or obese
- Physical inactivity
- Age over 55 (for men) or 65 (for women)
- Family history of CAD

The more risk factors you have, the greater your chance of developing coronary artery disease.
From Symptoms to Treatment

Your doctor may suspect that you have CAD because you have angina (chest pain or discomfort). Or a stress test may show that you have CAD. Receiving this diagnosis can be frightening. But having CAD doesn’t mean you’re destined to have a heart attack. Read on to learn about this condition and how it is treated.

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To treat CAD, a flexible tube (called a catheter) is threaded through the blood vessels to the heart. This enables the doctor to see and work inside the heart. Procedures using this catheter-based technique are called Percutaneous Coronary Interventions (PCIs). They can be used to perform:

- Angioplasty (using a tiny balloon to widen an artery) ................. page 8
- Stenting (inserting a wire mesh device into an artery to hold it open) .... page 9

Lifelong Management
Managing heart disease can reduce your risk of future problems. This management includes medications and lifestyle changes. Cardiac rehab (a special training program for heart health) can get you started on any lifestyle changes you need to make. You can also work on your own to exercise, change your diet, or stop smoking ................. page 12
How Coronary Artery Disease Develops

The heart is a muscle that pumps blood throughout the body. Like other muscles, the heart needs a steady supply of oxygen to function. Blood carries oxygen to the heart and the rest of the body through blood vessels called arteries. In the heart, the coronary arteries supply blood and oxygen to the heart muscle. If the heart doesn’t get enough oxygen, angina or a heart attack can result.

Healthy Coronary Arteries

Coronary arteries wrap around the surface of the heart. Their job is to supply the heart muscle with oxygen-rich blood. The amount of oxygen the heart needs depends on how hard it’s working. For example, exercise makes the heart beat faster, increasing the muscle’s need for oxygen. Healthy arteries can easily meet this need. They have smooth, flexible walls and can accommodate changes in blood flow.
 Coronary Artery Disease

CAD starts when the lining of a coronary artery is damaged. This is often due to a risk factor, such as smoking or high blood cholesterol. **Plaque** (a fatty material composed of cholesterol and other particles) then builds up within the artery wall. This buildup (called atherosclerosis) narrows the space inside the artery. It also makes artery walls less able to expand. At times when the heart needs more oxygen, not enough blood can get through to meet the need. This can lead to angina.

**Plaque Forms**
When the lining of the artery is damaged, plaque can form between layers of the artery wall.

**The Artery Narrows**
Plaque narrows the channel where blood flows. The artery can't meet increased demands for blood. This can lead to angina.

**Plaque Ruptures**
Plaque deposits sometimes rupture. A rupture can narrow the artery even more. It can also cause a blood clot to form. This is part of the body’s healing process, but it can also be dangerous.

**A Blood Clot Blocks the Artery**
If a blood clot cuts off blood flow in the narrowed artery, severe angina or a heart attack will result.

Heart Attack

A heart attack (myocardial infarction) occurs when a coronary artery is blocked by plaque or a blood clot. When this happens, the heart muscle beyond the blockage doesn’t receive oxygen. That part of the heart muscle dies. This damage cannot be reversed. Though most people survive heart attacks, a heart attack can be deadly.
Getting Ready

■ Tell your doctor about any medications you take. Include herbs, supplements, and over-the-counter medications.

■ Take medication as directed by your doctor. He or she may prescribe new medications. Or, you may be asked to stop taking certain medications before the procedure.

■ Tell your doctor if you are allergic to iodine, shellfish, or any medications.

■ Do not eat or drink after the midnight before the procedure, or as directed by your doctor.

■ Arrange for a ride home after the procedure. Pack a bag in case you need to stay in the hospital overnight.

■ Read and sign the consent form for the angiography and other procedures.

Possible Risks

Cardiac cath, angiography, angioplasty, and stenting all involve the same types of risks. But the level of risk is higher with angioplasty and stenting than with angiography. Risks may include:

■ Bleeding or clotting

■ Tearing of the artery lining

■ Abnormal heartbeat (arrhythmia)

■ Allergic reaction to the x-ray dye

■ Kidney damage or failure

■ Infection (very rare)

■ The need for emergency bypass surgery (very rare)

■ Heart attack, stroke, or death (very rare)

Looking for Blockages

Cardiac cath (catheterization) is the insertion of a catheter (flexible tube) into the coronary arteries. It is the first step in angiography, a way of looking at blockages in the coronary arteries. Based on the results of angiography, your doctor may advise procedures to open the coronary arteries. In some cases, surgery to bypass blockages is needed instead.
Before the Procedure
In a prep room, you’ll change into a hospital gown. The procedure may take a few hours, so you’ll be asked to empty your bladder and bowels. An IV line will then be started. Medication to relax you may be given through this line. You may also receive medication to reduce the risk of blood clots. Hair may be removed from the area where the catheter will be inserted. You’ll then be taken to the cath lab.

Cardiac Cath
You’ll remain awake throughout the procedure. Once in the cath lab, you will lie on an x-ray table:
- The skin in the area of the insertion site is numbed. An introducing sheath (tube) is inserted into a site in the groin, arm, or wrist. The sheath remains in place during the entire procedure.
- A catheter is slid over a guide wire. The guide wire is then inserted into the sheath and threaded through the arteries to the heart. Since arteries have no pain nerves, you won’t feel this.
- The guide wire is removed, leaving the catheter in place.
- During the procedures that follow, the guide wire and catheter may be removed and replaced several times. This is done to reach each of the coronary arteries.

Coronary Angiography
X-ray dye (contrast) is injected through the catheter. This allows coronary arteries to show up on x-rays, called angiograms. You may feel a warm flush as the dye is injected. Several angiograms are then taken, showing where blockages are. If angioplasty or stenting is needed, it may be done right away. But, depending on the locations of the blockages, your doctor may advise coronary artery bypass surgery. If so, this will most likely be scheduled for a later date.
Treating Coronary Artery Disease

If an angiogram shows a narrowing or blockage, angioplasty and stenting may be able to open the arteries. These procedures are done in the cath lab. Catheters similar to those inserted for angiography are used. In fact, these procedures often are done right after angiography. Depending on the location and size of the blockage, one or both procedures may be done.

Balloon Angioplasty

For this procedure, a special balloon-tipped catheter is inserted into the coronary artery. The balloon is then inflated to widen the artery. In most cases, angioplasty is followed by stenting.

During the Angioplasty Procedure

A guide wire is first threaded into place across the blockage. The balloon catheter is then slipped over the guide wire. Once in place, the balloon is inflated. This compresses the plaque against the walls of the artery, widening the channel. When the balloon is inflated, blood flow stops for a moment. As this happens, you may have angina for a short time. Tell your doctor if you feel any symptoms or discomfort. The balloon may be inflated one or more times before being withdrawn. An angiogram is then done to confirm that the artery has been opened, improving blood flow.
Stenting
A stent provides support for the artery. It’s done to help reduce the risk of restenosis (renarrowing of the artery in the same place). Stenting after an angioplasty is common. But in a growing number of cases, stents are placed directly, without angioplasty being done first.

What Is a Stent?
A stent is a tiny, flexible wire mesh tube. It remains in place permanently, to keep the artery open. Some stents are drug-eluting. These stents slowly release medication over a period of time. The medication reduces the amount of scar tissue that forms inside the artery. This helps prevent restenosis.

During the Stenting Procedure
The stent, in a collapsed form, comes mounted onto a balloon catheter. The balloon and stent are delivered to the blockage as with angioplasty. Once in place, the balloon is inflated. This pushes plaque against the wall and opens the stent. The balloon is then deflated and removed, leaving the stent in place. Depending on the size of the plaque, more than one stent may be used per blockage. After stenting, an angiogram is done to confirm that blood flow has improved.
Your Recovery

After angioplasty or stenting, you are likely to stay in the hospital overnight. If you had only an angiogram, you may be able to go home within 1 to 8 hours. Follow your doctor's instructions on caring for yourself after you go home. At follow-up visits, your doctor will assess your symptoms to see whether treatment has succeeded.

Closing the Insertion Site

The sheath in your groin, wrist, or arm will be removed, and the insertion site closed. This may be done while you are still in the cath lab. Or it may be done after you have been moved to a hospital room. You may need to keep still, with your leg or arm straight, for 2 to 6 hours. How long depends partly on the insertion site and the type of closure performed.

Monitoring Your Condition

You’ll be closely monitored after the procedure until you’re ready to go home. Your pulse and blood pressure will be checked often. Be sure to tell the nurse or doctor if you have angina or any other symptoms. The IV line will remain in place until shortly before you leave. Blood tests will be done to assess your condition. You may also have an electrocardiogram (ECG).

Going Home

Many people feel relief from their heart disease symptoms right away. So you may be eager to go home soon. You can go home when:

- Your condition appears stable.
- The insertion site is not bleeding.
- Your blood tests are cleared by your doctor.
- You have no signs of infection.
- You can urinate.
When to Call Your Doctor
Call your doctor if you experience any of the following during the week after the procedure:

- The insertion site is increasingly painful, swollen, red, bleeding, warm to the touch, or draining
- Fever
- Angina
- Inability to urinate, or blood in the urine
- Severe pain, coldness, or a bluish color in the leg or arm where the catheter was inserted

At Home
You can resume most normal activities soon after these procedures. Be sure to:

- Take all medications as directed by your doctor. This is crucial to the success of the procedure and to your health.
- Shower or take sponge baths for a few days if your insertion site was in the groin. Don’t swim, or soak in a tub.
- Avoid lifting anything over 10 pounds for at least 3 days. Your doctor can give you more specific guidelines.
- Avoid strenuous activities for about a week. Ask your doctor when you can resume driving, exercise, and sex.
- Talk with your doctor about when you can return to work.

Your Follow-Up
A week or two after the procedure, you’ll see your doctor for a follow-up visit. You may need certain tests, such as exercise stress tests. These assess your symptoms. You’ll also talk with your doctor about how to treat your risk factors for heart disease. Your doctor may advise that you enroll in a cardiac rehab program (see page 13).

Taking Blood Thinners
After the procedure, you may be told to take aspirin and a prescribed blood-thinning medication. Take both of these medications exactly as directed. Doing so helps prevent your blood from forming clots. This reduces the risk of heart attack and even death. Tell all your healthcare providers that you take blood thinners. Don’t stop taking these medications without getting approval from your heart doctor. This is true even if you have surgery or a dental procedure.

Watching for Restenosis
After angioplasty and stenting, an artery may become blocked again. If restenosis does occur, it will most likely be within 3 to 6 months after the procedure. Be alert for the return of the symptoms you had before the procedure, such as chest pain or discomfort. If you do notice symptoms, contact your doctor right away so you can discuss treatment options.
Lifelong Management

Angioplasty and stenting can open your arteries and relieve symptoms. But they don’t cure heart disease. You still need to control your risk factors to ensure your future health. This is a lifelong process, so get help in learning what you need to know. Cardiac rehab (rehabilitation) can help you learn to manage risk factors and improve your heart health.

Managing Risk Factors

Some of the risk factors for heart disease can be controlled. These include tobacco use, high blood pressure, cholesterol, diabetes, and obesity. They can be managed by means of medication, diet, exercise, and home monitoring. Support and counseling can also play a role. This may sound like hard work—and sometimes it is. But the effort can pay off: Managing risk factors can help you be more active, feel better, and reduce the risk of a heart attack.

What You Can Do

There’s a lot you can do to improve your heart health. Taking medication as directed can reduce the risk of a future heart attack. Lifestyle changes can also help you be healthier and feel more energetic and in control. To get the most benefit from medications and lifestyle changes:

- Accept that you will be taking medication each day from now on.
- Set up a routine for taking medication.
- Talk to your doctor or pharmacist if you have trouble with side effects.
- Accept that lifestyle changes are lifelong.
- Make a plan for tackling lifestyle changes. Set goals you can meet. And be sure to reward yourself when you make progress.
- Ask for support. Explain to family and friends why you’re making these changes. Then talk about how they can help.
Core Program Components
A cardiac rehab program can take place in a hospital, a clinic, or a doctor’s office. Core components of a program include:

- **Exercise.** You’ll learn how to exercise safely. Your program will include exercises to increase fitness, endurance, and strength.

- **Nutrition education.** You’ll work with a dietitian to learn the best ways to eat for heart health. You’ll also learn ways to use this knowledge when you shop, cook, and eat out.

- **Assistance with managing risk factors.** You’ll learn about controlling related conditions such as high blood pressure, high cholesterol, and diabetes.

- **Counseling.** You’ll get help dealing with the emotional aspects of heart disease and treatment. This may include help with depression and anxiety. It may also include practical advice and support for quitting tobacco, losing weight, being physically active, and continuing your sex life.

- **Family education.** Your family can learn with you. That way, they can help you to continue using your new skills and knowledge after you finish the program.
Taking the First Steps

Whether or not you enter a cardiac rehab program, you can take control to improve your heart health. Lifestyle changes can reduce blood cholesterol and blood pressure. They can also strengthen the heart muscle and improve diabetes control. Above all, these changes can help you feel better day to day.

If You Use Tobacco, Quit

If your doctor has been urging you to quit, it’s for good reasons. Smoking damages your heart, blood vessels, and lungs. It slows healing, damages your skin, and affects your senses of taste and smell. The good news is that quitting can halt or even reverse the damage. To quit now:

- **Get medical help.** Ask your doctor for advice on stop-smoking programs and smoking cessation aids.
- **Get support.** Join a support group. Ask for help from your family and friends.
- **Don’t give up.** Often it takes several tries to succeed in quitting.

Eat for Heart Health

Does your diet provide the nutrients you need to be healthy? How can you cut down on foods that may harm your health? Thinking about these questions as you shop and cook helps you make better choices. For a heart-healthy diet:

- **Add more vegetables, fruits, whole grains, and beans.** These contain fiber, which helps improve cholesterol levels.
- **Reduce salt.** Too much salt (sodium) can raise blood pressure. Packaged and processed foods are often high in sodium.
- **Eat less fat.** A high-fat diet can lead to higher blood cholesterol levels.
- **Choose the right kinds of fat.** Healthier sources of fat include vegetable oils, nuts, seeds, and fish. Reduce unhealthy sources of fat, such as meat, cheese, processed foods, and deep-fried foods.
Exercise Your Heart
The heart is a muscle. Like any muscle, it needs exercise to perform well. Exercise for your heart is called aerobic exercise. This means that the heart beats faster, but still in a safe range. To get started:

- **Talk to your doctor before starting an exercise program.** He or she may order a stress test to assess your condition.
- **Start slowly.** Work up to more vigorous exercise. Aim for at least 30 minutes of moderate exercise most days of the week.
- **Walk as much as you can.** Whenever you get into a car, ask yourself, “Could I walk instead?”

Lose Excess Weight
The idea of losing a lot of weight can seem overwhelming. So start by losing 5 or 10 pounds and keeping it off. Even a modest weight loss can improve blood pressure and help control diabetes. A dietitian can help create a weight-loss plan. To get started, try these tips:

- **Reduce portion sizes.** You don’t have to give up your favorite foods. But do eat less.
- **Cut out empty calories.** These include added sugar and added fat.
- **Burn calories with exercise.** This helps you reach and maintain a healthy weight.
- **Steer clear of fad diets.** There’s no magical solution to weight loss.

Wearing shoes that fit and support your feet makes your workout safer and more comfortable.

Weighing yourself weekly helps you see trends better than daily weighing does.
Make an Action Plan

Taking action is easier if you have a plan. Ask your doctor what changes you should make. What are your most important risk factors? What can you do about them? Then write down your goals. On the same sheet of paper, list one or two things you can do to meet each goal. Be sure to reward yourself when you meet your goals. And use your action plan to chart a healthier future for yourself!