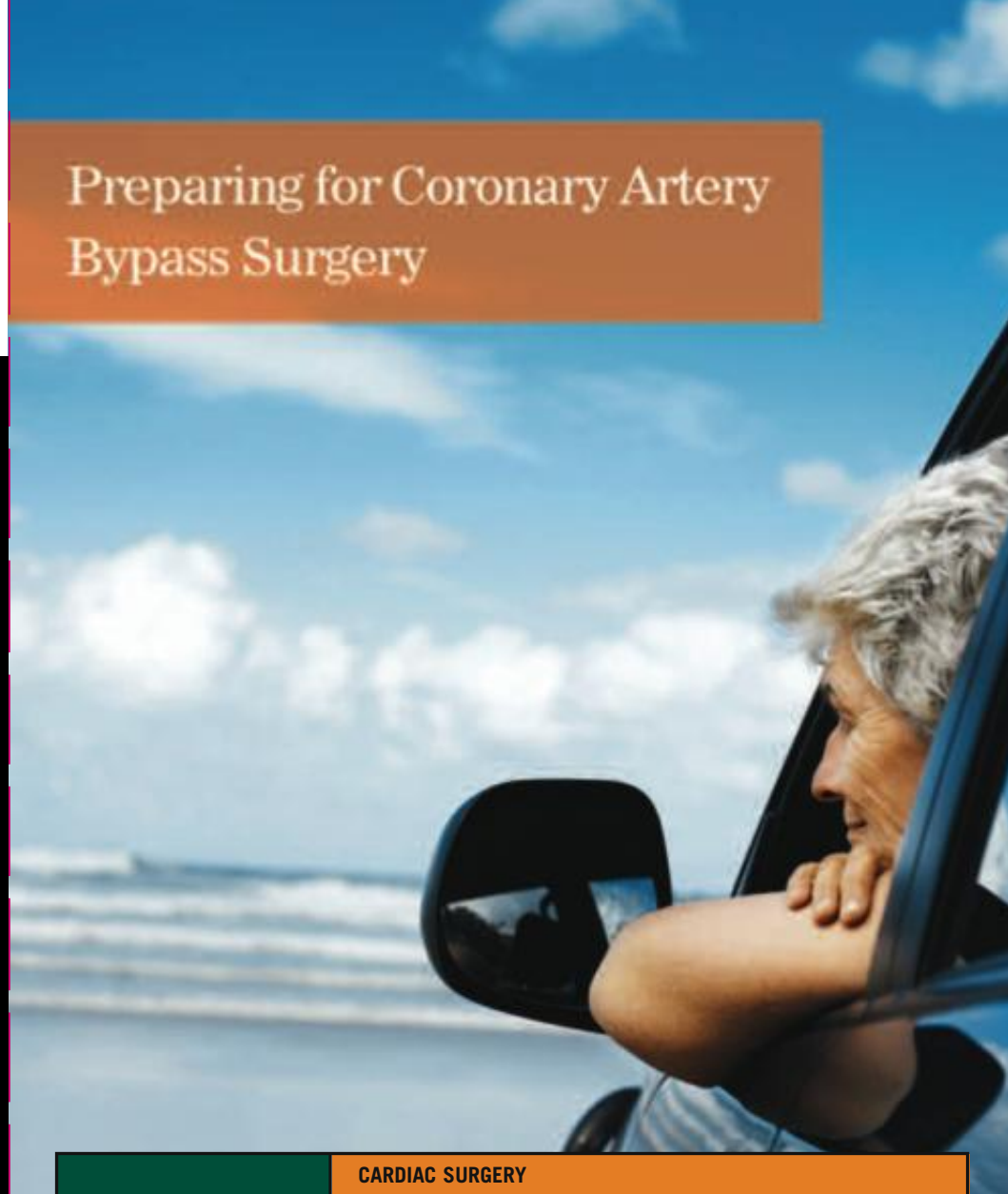


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Preparing for Coronary Artery Bypass Surgery



GUIDANT

CARDIAC SURGERY

Understanding Today's Options

Introduction

Every year, millions of Americans are diagnosed with some form of heart disease, and one of the most common is *atherosclerosis*. Although usually called “hardening of the arteries,” atherosclerosis is a complex process that includes thickening, loss of flexibility, inflammation, and clogging of the coronary arteries. Because you have this condition, your doctor has recommended that you have coronary artery bypass graft (CABG) surgery.

The purpose of this booklet is to help you and your loved ones understand two surgical procedures that are now commonly used during CABG in place of older, traditional procedures. These advanced techniques include:

- **Beating heart surgery:** A type of CABG procedure that is done without putting the patient on a heart-lung machine
- **Endoscopic vessel harvesting (EVH):** A way to acquire a healthy blood vessel using a much smaller incision

As you read about these procedures in this booklet, you will learn the benefits that each one may offer. You will also find a list of resources for additional information and a glossary of terms.

“I feel lucky to have caught my heart disease in time, to have had beating heart surgery, and to be back to my routine so soon.”

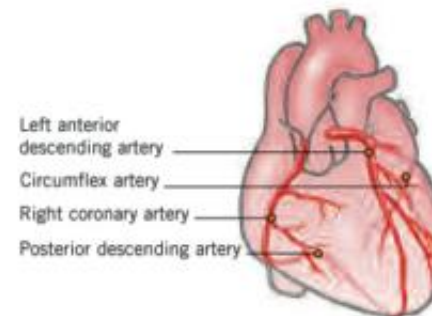
Robert Poggemann, Wisconsin



Overview of coronary artery disease

Your heart is the hardest working muscle you have. Its job is to keep blood circulating in and out of your lungs and through all the other organs and tissues in your body. Like any muscle, your heart needs plenty of oxygen-rich blood to stay healthy and keep functioning.

The blood vessels that surround your heart are called the *coronary arteries*. When fatty deposits called *plaque* develop in the lining of these arteries, several things can happen:



- The lining of the artery becomes thicker and rougher
- Plaque buildup makes it harder for blood to flow through the artery
- The heart has to work harder to pump blood
- The plaque may rupture, causing a blood clot that can completely block the artery; this stops the supply of blood to the heart muscle

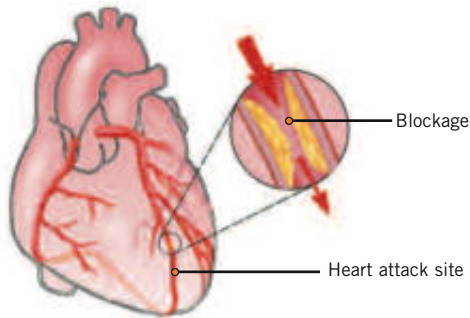
If one or more arteries become blocked, heart tissue doesn't get the blood supply it needs to function. The results can range from mild chest pain (angina) to a severe heart attack.

Understanding bypass surgery

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Because you have been diagnosed with coronary artery disease, your surgeon will perform an operation to restore healthy blood flow to your heart. In this procedure, one or more healthy blood vessels will be taken (or *harvested*) from your leg, arm, or chest and will be used to create “new” vessels for your heart.

Your surgeon will connect, or *graft*, one end of the harvested vessel to the aorta that supplies blood to the heart; the other end



will be attached at the surface of your heart, bypassing the blocked portion of coronary artery. It is not uncommon for a surgeon to perform three or four of these grafts during one operation.

“As a third-time bypass patient, I’m the kind of patient who’s most challenging. . . . I have lots of scar tissue from my earlier operations. [EVH] technology is especially helpful to patients like me.”

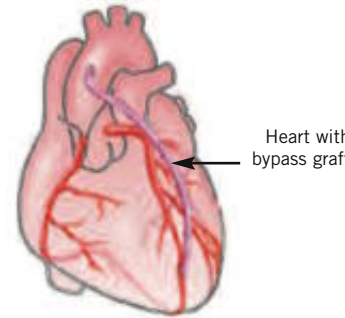
Tom Bailey, Delaware



Bypass procedures became routine in the 1960s, following the invention of the heart-lung machine. This device temporarily does the job of the heart and lungs while the heart is stopped during surgery. It puts oxygen into the blood and keeps it circulating while the surgeon makes the grafts. Once the operation is complete, the heart is returned to its normal rhythm and the mechanical pump is no longer needed.

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The heart-lung machine has made it possible for surgeons to save the lives of millions of patients. However, there are risks involved in its use:



- Attaching the heart-lung apparatus may cause damage to the aorta
- Blood clots may be released into the bloodstream and cause a stroke
- Brain function (thinking and memory) may be affected during recovery
- Patients may need to stay in the hospital longer to recover

Medical advances make beating heart surgery an option

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Over the past several years, advances in medical knowledge and surgical technology have made procedures like beating heart CABG a reality. This may be an option for your surgery; please read this information and discuss the possibility with your surgeon.

Beating heart bypass surgery is performed without using the heart-lung machine. Instead, special devices are used to position the heart; they can stabilize just the area where the surgeon is working, and this enables the heart to keep beating.

Research has shown that beating heart bypass surgery offers benefits to all patients. Recent findings have shown that beating heart procedures may be of particular benefit to patients at high risk, especially women and those with diabetes, a history of stroke, or otherwise poor health.

The benefits of beating heart surgery include:

- Less trauma to the system, since the heart-lung machine is not used
- Less risk of stroke
- Less risk of problems with memory
- Faster recovery rates
- Shorter hospital stays

“After having the surgery, I would recommend off-pump to anyone. Just two weeks later I felt like a million bucks.”

Kevin Lawler, Pennsylvania



Obtaining a blood vessel for grafting

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As mentioned previously, before your surgeon can create the bypass grafts, he or she will need to obtain a healthy blood vessel from another part of your body. This requires a separate procedure that is performed immediately before your heart surgery. One or more of these vessels may be harvested:

- The greater saphenous vein, which runs the length of the leg
- The radial artery, which runs from the wrist to the elbow in the arm
- The internal mammary artery, which is in the chest

The saphenous vein is often used for CABG. In the past, harvesting this vessel meant that one long incision was made from the ankle to the groin. This highly invasive *open* procedure often caused patients more pain than their chest incision, and the scar made patients self-conscious long after they recovered. Fortunately, this type of procedure is not in common use today.

More recently, a procedure called *bridging* was developed, which enabled the harvester to gain access to the saphenous vein through three or four smaller incisions of about three inches. This is one alternative to the open procedure, but it still has risks of complications such as infection, pain, and swelling.

Today, there is another option that usually requires only one small incision about one inch long. *Endoscopic vessel harvesting*, or EVH, can be used to harvest the saphenous vein from the leg or the radial artery from the arm. EVH uses special instruments to view and remove a blood vessel with much less trauma to the vessel itself or to surrounding tissues.

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In clinical studies, some important benefits have been shown in endoscopic vessel harvesting, including:

- Significantly less risk of infection and wound complications
- Less postoperative pain and swelling
- Faster recovery with minimal scarring
- Greater patient satisfaction



Whichever type of harvest procedure is used, the other blood vessels in the leg or arm take over and restore blood flow to normal. EVH not only causes much less pain and scarring, but means that patients can return to normal mobility sooner and begin their cardiac rehabilitation program.

EVH is now performed in most hospitals and is a good option for many patients. However, since every person is unique, you should discuss your choices with your surgical team; you'll receive recommendations for the procedures that are right for you.

What to expect before surgery

Beating heart surgery requires the same kind of preparation that traditional heart surgery does. Before the operation, you will meet with your surgeon and anesthesiologist; they will help you take steps to get ready. You may receive instructions including:

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- Bring your anesthesiologist a list of any and all medications that you are taking—even over-the-counter ones like ibuprofen or aspirin
- Do not eat or drink anything after midnight on the night before your surgery
- Do not bring personal items such as your watch, wallet, or jewelry to the hospital; ask a loved one to keep them for you

You may be given a sedative before you receive the general anesthetic; this will help you relax. In the operating room, you will receive the general anesthetic that will let you sleep through the surgery without feeling pain.

- Before your heart surgery begins, a blood vessel will be harvested from your leg, arm, or chest
- The surgeon will make an incision in your chest that exposes your heart
- Special tools will gently hold your heart in position while the surgeon performs the graft procedures
- Surgery will take from two to six hours, depending on how many bypass grafts need to be made



"The tiny incision made in my thigh meant that I had no pain in my legs afterwards. After my earlier operations I had large incisions that were very painful."

Tom Bailey, Delaware

After surgery: making a good recovery

When the bypass grafts are complete, your chest incision will be closed with stitches or surgical staples and you'll go to either a surgery recovery room or the Intensive Care Unit (ICU). Specially trained nurses will monitor your recovery closely.

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- You may have a breathing tube until you can breathe on your own
- After the tube is removed, you will be asked to cough and do deep breathing exercises; this keeps your lungs clear
- You will receive electrocardiograms (ECGs) blood pressure monitoring, and blood sampling
- If you feel pain, don't hesitate to ask for medication; your doctors and nurses want you to be comfortable
- You will be given a liquid diet at first, and then progress to solid food when your digestive system is ready
- You will be asked to sit, stand, and walk as soon as possible

Patients often find that the incisions in their legs or arms from traditional vessel harvesting procedures are more painful than their chest incisions. If you have an EVH procedure, you may experience little or no discomfort from the vessel harvesting.

Your hospital stay will range in length from three to seven days, depending on the type of procedure performed and any treatments that are necessary afterwards. Some patients who receive beating heart CABG surgery are allowed to go home within one or two days.

Even before you leave the hospital, you may be started on a rehabilitation program. This may be as simple as sitting on the edge of your bed with your legs dangling or taking a walk up and down the hallway.

When you return home

Before you leave the hospital, you should receive instructions about what to do when you are at home. These should include:

- Contacting your physician if your pain is not tolerable
- Observing your incisions for redness, swelling, or fluid drainage
- Keeping your lungs clear by coughing
- Staying active and walking
- Being careful about lifting heavy objects
- Resting when you feel tired

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Your doctor will also explain the importance of a cardiac rehabilitation program. Such a program will help speed your recovery and reduce your chances of having more heart problems in the future.



"My heart attack was a complication of pregnancy—very rare! The good news was that the surgeon who just happened to be in the hospital is a pioneer of the beating heart bypass. Without that technology, I wouldn't be here. I wouldn't have survived a traditional bypass."

Eliz Greene, Wisconsin

What's next?

Fortunately, today's less invasive surgical techniques mean that your recovery will probably be easier and faster than was possible in the past. As you return to your daily routine, you may find that you feel better than you have in a long time! This is because your heart is getting all the blood it needs and is better able to do its job.

A healthy blood supply keeps your muscles, organs, and even your mind working at their best—and a healthy heart is what makes this possible. The health benefits of EVH and beating heart bypass surgery really become apparent with a faster, safer recovery and a quicker return to normal activities.

Remember that your bypass surgery may have fixed one set of problems—but that your “new” arteries are just as susceptible to plaque. You can improve your chances of a longer, healthier life by making some simple changes that can reduce your risks of developing coronary artery disease. These steps include:

- Quitting smoking
- Managing high blood pressure
- Eating a healthy diet
- Controlling high cholesterol
- Exercising regularly
- Reducing your weight

For more information on beating heart surgery and endoscopic vessel harvesting, or questions you may have about your treatment, please contact your physician.

This brochure is not intended to be a substitute for an informed discussion with your physician. If you have questions about the procedures described here, please discuss them with your healthcare team. Not everyone will be a candidate for EVH or beating heart surgery; however, we hope that you will discuss these options with your physician and surgeon.

“There wasn’t much discussion of whether or not beating heart surgery was right for me. . . . [My doctor] was confident the surgery was a success, and that there were no complications. I was home from the hospital in 36 hours.”

Warren Torgerson, Wisconsin



Glossary

Anesthesia: Local or general inability to feel pain, with or without the loss of consciousness.

Anesthesiologist: A physician who is specially trained in pain management, intensive respiratory care during surgery, and resuscitation.

Angina: A severe constricting pain. Called *angina pectoris* when it affects the chest or heart.

Artery: Any blood vessel that carries oxygenated blood from the heart outwards to the organs and tissues of the body.

Atherosclerosis: Deposits of plaque on the inner surfaces of large and medium-sized arteries. Called *hardening of the arteries* because plaque reduces the ability of affected vessels to allow normal blood flow.

Beating heart surgery: Any type of cardiac surgical procedure that is performed while the heart maintains its normal rhythm, without the use of a heart-lung machine.

CABG: Cardiac artery bypass graft; a specific type of heart surgery. Also called *bypass surgery*.

Clot: A mass of red blood cells, white blood cells, and platelets held together with a flexible protein. A clot can be good when it helps to close a wound, but if one is released into the bloodstream it can lodge in the brain and cause a stroke.

Endoscope: A device that includes a tiny camera so the user can visualize tissues inside the body, and that has a variety of tips and tools to enable the user to perform different procedures. Allows many types of surgery to be performed with very small incisions.

EVH: Endoscopic vessel harvesting. The use of an endoscope to harvest a healthy blood vessel to be used as a graft in CABG surgery.

Electrocardiogram (ECG, EKG): A diagnostic recording of electrical signals within the heart that show heart muscle function.

Graft: A surgical procedure to add or replace tissue such as blood vessels in order to repair damage. May also refer to the tissue used.

Resources for information and support

Guidant Corporation

Information for patients and families
www.guidant.com/patient/

Heart Surgery USA

A site with information on heart disease, EVH, and beating heart surgery; you can also hear Kevin Lawler and Tom Bailey talk about their experiences with beating heart surgery
www.heartsurgery-usa.com

American Heart Association

The nation's resource for heart and stroke information
www.americanheart.org

Mayo Clinic Heart Center

A comprehensive resource for accurate, reassuring information
www.mayoclinic.com

National Heart, Blood, and Lung Institute:

Latino Cardiovascular Health Resources

A full range of heart health information and support in English and Spanish
www.nhlbi.nih.gov/health/prof/heart/latino/latin_pg.htm

Just Move

Exercise information for everyone from the American Heart Association
www.justmove.org

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Talking with your doctor

After reading this booklet, you may have questions for your doctor. Don't hesitate to ask; the more you know, the more you can take an active role in preparing for your surgery and recovering afterwards. On this page, you'll see several of the most frequently asked questions about beating heart surgery and the EVH procedure. There is also room for you to write down your own questions. Tear out this page and take it to your consultation.

- What are the risks I might expect from having open heart surgery? _____

- Can my CABG surgery be performed using the beating heart procedure? _____

- Is endoscopic vessel harvesting (EVH) an option for me? _____

- Will you use my arm or my leg to obtain a healthy blood vessel? _____

- How long should I expect to be in the hospital? _____

- How long before I start my rehabilitation program? _____

- When I get home from the hospital, what activities can I resume soonest? _____

Use the other side of this page to write down your own questions.

Harvest: The process of acquiring a healthy blood vessel for use in CABG surgery.

Heart attack: A blockage of arterial blood supply that causes damage to or destruction of heart muscle tissue. Also called a *myocardial infarction*.

Heart-lung machine: A mechanical pump that keeps the body supplied with oxygenated blood during traditional forms of heart surgery in which the heart itself is stopped in order to allow surgical procedures to be performed.

Invasive: Requiring an incision or puncture into the body. Used to describe a medical procedure.

Mammary artery: A large artery that passes along the lining of the chest in both men and women. It is used to create bypass grafts.

Plaque: A substance made up of cholesterol and fats (lipids) that collects in the inside lining of arteries, restricting or blocking the flow of blood.

Radial artery: A blood vessel that runs from the elbow to the wrist. It is one of the blood vessels that can be used for bypass grafts.

Saphenous vein: A long blood vessel that runs the entire length of the leg and from which sections can be harvested to create bypass grafts.

Sedative: A drug or other agent that produces a calming effect, used to cause relaxation or reduce anxiety, irritation, or stress.

Stroke: A sudden loss of function due to a blockage of blood supply to the brain. Symptoms may be mild (slurred speech or blurred vision) or severe (paralysis, unconsciousness, or death).

Surgical staples: Sterile metal fasteners used instead of stitches to close external wounds; usually removed within a few days as tissues heal.

Vein: Any blood vessel that carries dark, unoxygenated blood toward the heart, from which it is pumped into the lungs.

Vessel: Any duct, canal, or tube that contains or carries a body fluid. Used to describe either an artery or a vein that carries blood.

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Just Move

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