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INTRODUCTION

This information packet has been prepared for you, the patient, and for your family. You have been informed that you need heart surgery. You probably have a great many thoughts and feelings about the surgery, about the hospital experience and going home. We hope that this information, prepared by physicians, nutritionists, nurses and social workers, will help you and your family understand the reason for surgery, the surgical procedure itself, what hospitalization will involve, and how to take care of yourself when you go home. You are welcome to discuss further questions or problems with any member of the health care team. Please do not hesitate to call upon them.

BEFORE SURGERY

YOUR HEALTH CARE TEAM

Your health care team consists of your surgeon, cardiologist, anesthesiologist, house staff physicians, nurse practitioners, nursing staff, nutritionist, physical therapist and social workers. Working together they provide quality health care to you and your family. Cardiology staff members will work with the cardiac surgical team during your hospital stay. Nurse Practitioners are advanced practice nurses who work closely with your surgeon. They play a major role in your postoperative care and in the discharge planning process. The nursing staff consists of Registered Nurses (RNs) and nurses aides who will provide care throughout your hospital stay.

SCHEDULING

Your surgeon will tell you the date your surgery is scheduled. Sometimes, however, surgery is delayed due to an emergency that requires the surgeon's immediate attention, the unexpected results of your preoperative testing, or an illness such as a cold.

The surgical team will make every effort to perform your surgery on the scheduled day. If this cannot occur, you will be informed as soon as possible and a new date will be scheduled.

PRE-ADMISSION TESTING

Your physician's office will schedule you for pre-admission testing (PAT) several days prior to your admission.

Many patients are admitted on the morning of their surgery. This allows you to remain at home the night before and spend that time with your family. If you do not have pre-admission testing and/or are not a same day admission, the necessary tests and assessments will be done in the hospital prior to your surgery.

RISKS OF OPEN HEART SURGERY

Prior to surgery, you need to discuss the benefits and risks with your surgeon. The risks of open heart surgery include: death, stroke, heart attack, bleeding, infections, arrhythmia's (irregular heart beats) and conditions that may adversely effect the kidneys, lungs, stomach or liver. The risks should be discussed before surgery with the attending cardiologist, surgeon and other members of the health care team. The risk of one or any of the above adverse events occurring is variable and dependent on a patient's clinical condition, co-existing diseases and procedure to be performed.

RECUPERATION

The length of hospitalization may vary greatly, depending on the type of operation and your overall condition before surgery. Many patients are discharged within 5 days. Home recuperation lasts 4-12 weeks after discharge. Before your operation, ask your physician about activities and limitations during the recovery period. This information packet provides general guidelines as to what you will and will not be able to do, though specific activities often cannot be determined until after surgery. It is best to discuss your questions in the presence of your spouse or family, so that everyone understands the activity guidelines and your concerns can be clarified.

BLOOD DONATIONS

Heart surgery patients often need blood replacement. The amount required varies with the particular surgical procedure. You are encouraged to ask your family and friends to donate blood. In addition, discuss with your surgeon the possibility of you donating a unit of your own blood, prior to surgery, which would be set aside for you at the time of surgery. If you cannot find anyone willing or able to donate blood, you still will receive all the blood you need. For the specifics of blood donation, telephone or visit the Volunteer Blood Donor Program (263-5440), located on the main corridor of the Schwartz Health Care Center, at the 530 First Avenue entrance of the Medical Center.

PRIOR TO YOUR SURGERY

Medications such as Coumadin (Warfarin) or aspirin should be discontinued as outlined by your surgeon or cardiologist. Some of your cardiac medications may be adjusted in the days immediately before surgery. After midnight on the day of surgery, nothing by mouth may be taken except for prescribed medications. The restriction includes water except for the small amounts necessary for taking medications. The anesthesiologist will be the person who tells you what medications to take.

If you are to be admitted the day of surgery (SDA), please note the checklist in the SDA packet which identifies the personal items you should bring to the hospital. If you are in the hospital prior to surgery, on the day before the operation your clothing and all valuables, including rings, are to be taken home. Only slippers, dentures, glasses and selected toilet articles will be stored on the nursing unit.

THE DAY OF SURGERY

On the day of surgery, the cardiovascular surgeon should know where your family can be reached, i.e. at home, at work or in the hospital. Your family should call the surgeon's office at 10:00 a.m. to inform the office where the family can be reached. One person should be identified as the contact person who will be called when the surgery is completed.

The family waiting area in the hospital is located on the first floor of the hospital across from the elevators where there is a phone so that they may be called when the surgery is completed.

GOING TO THE OPERATING ROOM

Immediately prior to surgery, you will be asked to get up and go to the bathroom to empty your bladder. When you return to bed you will be given several injections which are prescribed by your anesthesiologist to help relax you. These may make you feel drowsy.

The side rails will be placed up as a reminder not to get out of bed without assistance. Shortly after you receive these medications, an operating room attendant will assist you in moving from your bed to a stretcher. You will then be transported to the sixth floor operating room (OR).

In the OR, your anesthesiologist will begin intravenous fluids and will attach you to the cardiac monitor before anesthesia is administered.

WHILE IN THE HOSPITAL

PATIENT CARE AREAS

You may spend time in some or all of these units after your surgery. Visiting hours differ and in all units visiting is at the nurse's discretion.

Cardiovascular Special Care Unit (CVSCU)

After the operation, you will be taken immediately to the Cardiovascular Special Care Unit (CVSCU). This is located on the 6th floor, the same floor as the Operating Room. This area is designed specifically to give you constant specialized care and monitoring. Physicians, nurses and other highly skilled professionals work together with you to achieve a smooth recovery.

As you awaken, you may be disoriented and may even wonder when the operation will begin, only to be told that it is over! You probably will feel very tired and sore in your chest, neck or back. There will be many people around your bed, but this is no cause for alarm, because they are there to help you.

You will not be able to speak upon awakening due to the presence of a tube in your mouth (endotracheal tube - ET tube) which extends into your trachea and supports your breathing while under anesthesia. The nurse in the CVSCU will be able to communicate with you even though you can not speak at first. The goal is to remove the ET tube as soon as possible. Your ability to remain calm and cooperative is helpful in achieving this goal. Patients remain in the CVSCU depending on individual needs. Visitors are limited to two (2) per patient. Therefore, only immediate family visit. Please refer to the Information Sheet in the packet that lists visiting hours.

Intensive Care Unit (ICU)/Post-Operative Unit (POU)

From the CSCU, patients may be transferred to the ICU on the 15th floor (east side) or to post-operative units on the 12th or 14th floors, where visiting is limited to two persons at a time. **No children** under that the age of fourteen are permitted in any area.

The Post-Op, Intensive Care Units and CVSCU have been designed and equipped to provide maximum nurse observation and care of patients during a period of acute illness. The environment can be stressful. Be assured that the equipment and somewhat "busy" atmosphere are characteristic of critical care and of our concern for the patients there.

Regular Hospital Room

Once in a regular room, you will be able to sleep for longer, undisturbed periods. You will continue receiving the necessary medication and nursing care designed to return you to "normal". Continued progressive ambulation and participation in self-care is encouraged to ensure independence and timely discharge. This includes coughing, deep breathing and using your incentive spirometer. Members of the health care team will be working with you to promote your recovery.

INPATIENT REHABILITATION

Some patients will require a period of inpatient rehabilitation after surgery. This need is determined by your post-operative and discharge needs. It is an individualized program where the average stay is 1 week to 10 days. Patients who may be possible candidates for inpatient rehab will be evaluated by a physiatrist (rehab doctor) and other members of the rehab team. Since insurance policies may vary in covering this service, check to see if your policy covers this service, and, if so, what type of precertification is needed.

IMMEDIATELY AFTER SURGERY

Your Incision

On most open-heart patients, surgery is performed with a median sternotomy approach. This means your incision will extend from where your sternum begins (slightly below your collar bone) to about where the sternum ends. The surgeon will cut the skin and then will cut the sternum in two. The ribs are left untouched, but will be spread apart to reveal the heart. To close the incision, the two edges of sternum are wired together. These wires remain in the bone permanently (and only will be visible on an x-ray). The skin on the chest (and the legs, if you are having bypass surgery) is closed with staples or silk sutures.

If your surgery is performed minimally invasively, you will have an incision underneath your left or right breast. However, for aortic valve procedures the incision will be on your right upper chest. The ribs are not removed or broken during this approach. Incisions are all closed with sutures and steri-strips.

If the endovascular balloon catheter system is used for cardio-pulmonary bypass, a 1-2" long incision will be made in one or both of your groins. These are also closed with silk sutures and steri-strips.

Cardiac Monitoring

You will be connected via electrodes (pads) on your chest to the cardiac monitor. This will give a constant readout of your heart rate and rhythm (EKG). The nurses will closely observe this monitor.

Blood Pressure

While you are asleep, the anesthesiologist will insert into one of your arteries (either at your wrist or at your groin) a cannula (tube) to connect to the monitor. This gives medical personnel a constant readout of your blood pressure and allows blood samples to be obtained. This special arterial line will be removed when it is no longer necessary, generally a day after surgery.

A special intravenous line is also inserted into a neck vein while you are asleep. This tube is also connected to the monitor, and displays a constant readout of the pressure from within your heart and lungs. This too will be removed the day after surgery depending on your condition. By the time you progress to a regular room, there will be a small intravenous catheter in the arm.

Chest Drains

One to three drainage tubes are placed in your chest at the end of surgery. They remove air and fluid and are connected to vacuum containers at the side of your bed. These containers make a bubbling sound you may be able to hear. These drains generally are removed 12-48 hours after surgery.

Urinary Catheter

This tube is placed in your bladder through your penis or urethra (the opening in women where urine is passed) when you are asleep, to allow all the urine your kidneys produce to be monitored constantly. Your urine output is one measure of your kidney function. It is generally removed 12-24 hours after surgery. After it is removed, you must save your urine in a bedpan or urinal for the nursing staff to measure.

Pacemaker Wires

The surgeon places two or more temporary pacemaker wires on your heart. These wires are connected from your chest by a cable to a temporary pacemaker box. Almost every patient has the standby pacemaker to control the heart rate. The wires will be removed before you are discharged. Once the wires are removed, you can shower.

Ventilator

When you are asleep in the operating room but before surgery begins, the anesthesiologist inserts an endotracheal (breathing) tube in your trachea (windpipe) via your mouth and vocal chords. During surgery, the breathing tube is connected to a ventilator which moves air and oxygen into your lungs. As you recover from the effects of anesthesia, the respirator also allows you to do more of the work of breathing yourself. When you are able to breath adequately on your own and when you are fully awake, the breathing tube is removed.

Intravenous Tubes

One or more tiny plastic tubes also will be inserted into arm or neck veins, to provide you with fluid, medications and monitor your cardiac status.

THE FIRST FEW DAYS AFTER SURGERY - “POST-OP”

How rapidly you progress through the patient care units will be determined by your condition and your body’s response to surgery. During the first few days, you will be observed constantly by the health-care team. Your blood pressure will be taken frequently, and doctors and nurses will monitor your other vital signs carefully. Each day, you may have a chest x-ray and an electrocardiogram, and blood may be drawn.

Pain medication will be ordered to alleviate most of your discomfort. An effective pain medication makes it easier to cough and deep breathe, relieves discomfort, and facilitates your recovery.

Your active participation is essential for your recovery. Doctors and nurses will allow you as much uninterrupted rest as possible, but activity begins almost immediately after you wake up from surgery. Foot and leg exercises stimulate circulation. Walking restores strength and independence. Due to all the activity, the lack of sleep and the constant noise of the critical care area, you may find it hard to determine the day or time. Weird or strange dreams or slight confusion about recent events are not uncommon.

One of the most important ways you can help yourself is by coughing and deep breathing. The breathing exercises you practiced before surgery will be continued every hour for awhile, to clear your lungs of mucus. To facilitate deep breathing and promote circulation, you will be allowed to get out of bed to sit in a chair and even may take a few steps soon after surgery.

EMOTIONAL RESPONSE AFTER SURGERY

Often, emotions are unstable following heart surgery. It is not uncommon to feel depressed, angry or out of control. There are both psychological and physical reasons for such emotional upheaval. Such depression may be manifested as lack of appetite, apathy or crying. All these symptoms, as well as transitory personality changes, should disappear within a short period of time. It is not uncommon that a staff psychiatrist be consulted to assist in your emotional recovery. It may be a while before you feel a marked improvement in your sense of well-being. During your recuperation, you will experience good and bad days. The recovery period can be emotionally and physically trying for both the patient and family. Many patients feel isolated, as they begin making the transition from hospital to home. Unpleasant emotions such as anger, denial, frustration, depression and hostility can occur. Families should know that it is also normal for them to be upset when someone they love has major surgery. The result may be frustrations, anger or feelings of deprivation. Family members should be aware that they may also receive the brunt of a patient's depression or anger, because it is easier and safer to direct feelings at them rather than at the hospital staff. The doctors, nursing staff and cardiovascular social worker will be valuable resources to assist you and your family during this difficult time.

GENERAL DISCHARGE INSTRUCTIONS

Throughout your hospital stay, members of your health care team will help you with your discharge needs. Recovery at home is variable. Some days you will feel better than others. You will have to judge how much activity you can tolerate, and you will have to plan your daily activity to attain a moderation of rest and activity. Some patients find when they first go home that simply getting up in the morning, showering and dressing is enough to tire them out, so they have to sit down and rest. The right amount of activity should make you feel better, not worse. You also have no energy reserve at this point in your recovery, so you will find yourself tiring easily, especially when performing an activity for the first time. So, the key concepts are moderation, rest, and gradual resumption of activity.

GENERAL CARE GUIDELINES

The following are general guidelines on how to care for yourself after leaving the hospital. If you have questions or concerns, do not hesitate to discuss them with your health care team.

Care of Incisions

Shower daily, gently cleansing your incisions with mild soap and warm water. Soaking in a bathtub is not recommended. Application of lotions or powders directly on the wounds is not recommended. Steri-strips, clips, staples or stitches will be removed at the discretion of your surgeon.

Itching, tightness or numbness along the incision line is generally normal. Watch for unusual changes in your wound as it heals or for signs of infection. These may include swelling, redness, warmth, tenderness, drainage or running a temperature greater than 101°F. If any of these symptoms occur, contact your surgeon's office.

Bandages

If you have swelling (Edema) in your feet/legs, particularly on the leg where the incision is, you may be advised to wear ace wrap bandages. Ace bandages are worn during the day (you can remove them at night). The ace bandage should be placed on so it feels snug and when it is removed you should see small indentations in the skin where wrapped.

The procedure is as follows: start at the foot above the toes. Secure ace bandage on mid-portion of foot and start to wrap, from the toe up to the knee, making sure to cover the heel, and wrap continuously so there is 1 to 2 inch overlap. Wrap the lower leg until you reach below the knee (do not include the knee). And remember, try to elevate legs above level of your heart whenever sitting. Consult with your surgeon on follow-up for continued care.

Diet

Immediately after the operation, your surgeon may allow you a liberal diet, which may be modified by a cardiologist based on your needs when you are fully recuperated. A nutritionist is available for a dietary consultation.

Since bypass surgery does not cure coronary artery disease, patients will always need to be concerned with the cholesterol, and fat content of foods and with minimizing any other coronary artery disease risk factors (i.e., obesity, diabetes). Patients who have had valve surgery need to be concerned with the salt (sodium) intake. Sodium generally increases fluid retention and make the heart work harder. Again, ask the nutritionist about specifics of your particular diet.

Drinking

Alcohol in moderation is acceptable. An occasional drink before or during dinner or at bedtime may continue, if you are so accustomed. Remember that alcohol should not be consumed if you are taking tranquilizers, sleeping pills or pain medication. If you are on a medication called Coumadin, let your doctor know if you will be drinking, so your Coumadin dosage can be adjusted accordingly.

Activity

It should take 2-4 weeks for your incisions to heal. You are advised not to lift, pull or push anything heavier than 5 to 7 pounds. You should avoid activities such as shoveling snow, swimming, playing tennis or golf, or other aerobic sports until you check with your physician. Enjoy going to the movies, dining out and visiting with company.

Sexual activity may be resumed as soon as you feel ready. Sexuality encompasses a whole spectrum of emotions, feelings, and activities. An important part of resumption of sexual activities is open communication between both partners involved regarding concerns, fears, and feelings. Two cautions about sexual intercourse: Do not put undue pressure on the chest, and female patients should not get pregnant until consulting with their physicians.

Do not drive a car until you get approval from your physician. This will happen approximately 2-4 weeks after surgery. You may be a passenger. Remember to wear your seat belt.

Medications

If you are taking medications on discharge, your doctor and nurse will give you instruction before going home on how to take the medications and possible effects. Make sure you fill your discharge prescriptions.

Smoking

NO SMOKING! Smokers are at increased risk for developing atherosclerosis. If you smoke, **STOP!** It is usually helpful to attend a program that offers group support and behavior modification techniques. Ask your doctor about using nicotine patch or gum or medications such as Zyban, in addition to attending a smoking cessation program. A list of resources to help you stop smoking can be found in the Resource Section.

Walking

Walking is an excellent exercise. But again, as with all other activities, walk slowly, pace yourself. In cold or inclement weather, dress appropriately before going out. Patients have found shopping malls good places to walk (if one is convenient for you). In general, start by walking **five minutes**, three or four times a day for the first week; increase this by five minutes each week (that is, 10 minutes in week two, 15 in week three, etc.).

Post-Operative Fluid Status/Weight

Monitoring your daily weight during the first few weeks at home is very important, especially if you have had problems with swelling (edema) after surgery and/or you are taking diuretics (water pills, such as Lasix, or furosemide). Your weight is a sensitive indicator of your body's fluid volume. Check your weight every morning (on the same scale, in the same type of clothing), and keep a record of your daily weight. Bring this record of your weights with you when you return for your follow-up appointments with your surgeon and cardiologist. Report to your doctors a weight gain or loss of greater than 5 pounds in 2-5 days; too rapid a gain or loss of weight might indicate that your diuretic medication need to be adjusted.

Return to Work

The vast majority of cardiac patients who were employed return to work. How soon depends on several factors: your recuperative powers, the type of surgery you had, and the type of work you do. Employment, as with all other activities, should be resumed gradually. Many have found it helpful to go back to work part-time at first. You are advised to get clearance from your surgeon and/or cardiologist prior to returning to work.

Special Instructions

Endocarditis is an infection involving the inner lining of the heart. It can result from dental work (including dental cleaning), certain types of surgery or procedures (such as a colonoscopy), or unrecognized

infections elsewhere in the body. Patients who have had valvular heart surgery and those who have had congenital defects repaired must take special precautions to protect the heart from Endocarditis. This means you must inform all physicians, dentists, podiatrists, and other health care personnel about your surgery. You will need to take antibiotics before and after any invasive procedure, including dental work such as teeth cleaning, and gum surgery.

Your surgeon requests that you not undergo any elective, non-emergency invasive procedures (including dental cleaning) for the next 6 months. Good oral hygiene and regular dental check-ups are essential to maintaining good health. If you develop a fever or sore throat, contact your cardiologist or internist to determine if antibiotics are necessary.

If you are on Coumadin you will need close follow-up which will require frequent blood tests. You are required to contact your physician's office periodically to receive instruction on Coumadin dosage and International Normalizing Ratio (INR) blood levels.

Return Visits to the Physician

In general, your cardiovascular surgeon will want to see you in two-three weeks after discharge. You must call the surgeon's office to make this appointment. When you arrive home from the hospital, call your referring or local doctor to make an appointment to see him/her within one week. He/she will receive all the records and reports of your surgery and hospitalization. If you are on Coumadin you will need frequent blood tests and initially after surgery you may need to contact your physician **daily** to obtain your Coumadin dose while it is being adjusted.

We hope this booklet has been helpful to you and your family. If you have any questions, or concerns, do not hesitate to ask your doctor or nurse.

WHEN TO CALL YOUR SURGEON

Call the doctor for the following possible danger signs:

- ◆ Fever over 100.8°
- ◆ Changes in incision including
 - redness
 - swelling
 - drainage that is yellow or foul smelling
 - separation of edges of incision
- ◆ Pain not relieved by usual pain medication
- ◆ Unusual fatigue not relieved by rest
- ◆ Shortness of breath
- ◆ Return of symptoms that you had before surgery such as: chest pain, shortness of breath, etc.
- ◆ Weight gain (more than 5 lbs. in 2 days)
- ◆ Swelling of feet, ankles and legs

In addition, if you have any unusual symptoms, please call your surgeon.

THE HEART

The heart is an organ located in the center of the chest. Its function is to pump blood to the lungs and the body.

The heart is a muscle and like all muscles it needs oxygen rich blood. Blood is brought to the heart muscle through the coronary arteries, which are the first blood vessels off the aorta.

The Coronary Arteries

The right coronary artery supplies the right side of the heart, as well as part of the back wall of the left ventricle. The left coronary artery has three areas. The first section is the left main; it divides into two major branches, the left anterior descending and the left circumflex. These branches supply the heart's left side and the septum.

The Heart as a Pump

The heart is divided into four chambers. There are two upper chambers called atria. There are two lower chambers called ventricles. The septum separates the heart into a left and a right side.

The right atrium receives blood low in oxygen from the body's veins. It then sends the blood to the right ventricle where the blood travels through the pulmonary artery to the lungs. There, the blood is enriched with oxygen. The oxygen-rich blood travels to the left atrium then to the left ventricle which pumps it to the body via the aorta.

There are four valves through which the blood must travel. The valves open and close depending upon the heart's contractions and prevent the blood from flowing backwards.

- The tricuspid valve is between the right atrium and the right ventricle.
- The pulmonary valve lies between the right ventricle and pulmonary artery.
- The mitral valve lies between the left atrium and the left ventricle.
- The aortic valve lies between the left ventricle and the aorta.

The Pumping Cycle

Both sides of the heart work together in a pumping cycle, usually repeating it 60 to 100 times per minute. This is felt as the pulse. Heart rate can vary depending upon many factors such as activity, anxiety, degree of heart disease, and certain medications which you may be taking.

HEART SURGERY

Heart surgery refers not only to surgery on the heart itself, but also to procedures performed on the great blood vessels, such as the aorta and the pulmonary artery as well as the coronary arteries.

OPEN-HEART SURGERY

In open-heart surgery, the surgeon literally opens the heart or the vessels to see and correct the defects. Access to the heart usually is gained through a vertical incision that divides the breastbone (sternum). Circulation of blood through the body is taken over by a heart-lung machine during open-heart surgery. Types of cardiac surgeries performed today are valve repair and replacement, bypass and some congenital cardiac defect repairs.

MINIMALLY INVASIVE HEART SURGERY

Certain cardiac surgery procedures are now able to be performed using a minimally invasive approach. Instead of the standard incision through the sternum (breast bone) open heart surgery can be performed through a small incision on the right or left side of the patient's chest. The incision length is 3-6 inches and location depends on what procedure is done. Mitral valve, tricuspid valve, ASD and VSD operations are done via an incision under the patient's right breast. Coronary artery bypass procedures are performed under the patient's left breast and aortic valve operations are performed on the right chest 1-2 inches below the clavicle (collar bone). Although a smaller incision is used, the same operations are performed as if the sternum were opened. This less invasive surgery is possible because the patient is placed on the heart-lung machine with catheters that are placed through a neck vein and a one inch incision in the groin to access the femoral artery and vein (endovascular catheter system).

In addition, in certain instances when medically appropriate, coronary artery bypass procedures can be done without the heart-lung machine on a beating heart. The incision for this procedure would also be on the left side of the chest.

CORONARY ARTERY BYPASS

Coronary bypass is the most common procedure for improving blood supply to the heart. A vein or artery from another part of the body (leg, arm, chest) is used to construct a detour around a blocked artery. Surgeons usually use the saphenous vein from the thigh and/or lower leg. This is the vein that is removed when varicose veins are stripped. The saphenous vein can be removed, as there are many other veins in the leg that can take over its function. At surgery, one end of the vein is sewn into a tiny opening made in the aorta. The other end is sewn into the blocked artery down past the area(s) that is (are) obstructed. As many as six bypass grafts may be constructed on various heart vessels.

Another technique using arteries, such as the internal mammary artery which lies close to the heart, frequently is used either alone or combined with vein grafts. The radial artery is another vessel that may be used for bypass grafts. The result is an improved and consistent blood supply to the heart.

HEART-LUNG MACHINE

Thanks to the invention of the heart-lung machine, open heart surgery now can be performed safely and with minimal complications. Also called the bypass machine or pump, this device allows the surgeon to operate on a virtually non-moving, dry heart while the rest of the body continues receiving the oxygen-rich blood it needs. The machine temporarily takes over the function of the heart and lungs. During surgery, plastic tubes carry blood from the body to the heart-lung machine, which warms or cools the blood, removes carbon dioxide, adds oxygen, filters the blood and pumps it back to the body. The machine is removed when the heart and lung have resumed normal functioning.

DISEASES REQUIRING OPEN HEART SURGERY

Sometimes two or more of the following conditions are present at the time of surgery and may be corrected simultaneously. Combined procedures naturally carry a higher risk.

Coronary Artery Disease

Coronary artery disease is the most common kind of heart disease in the Western world. The risk factors for coronary heart disease that cannot be controlled are age, family history and sex. Over time, the chances of developing coronary disease increase in relation to the aging process itself. Also, a family history of coronary heart disease increases an individual's chance of developing the disease. Males, more than females, develop this disease before age 50. However, statistics for women with coronary artery disease are rising. Risk factors we can do something about are: smoking, lack of exercise, poor nutrition and stress. Those with diabetes or high blood pressure should always follow their doctor's recommendations for treatment of these disorders.

Atherosclerosis

Atherosclerosis, hardening of the arteries, can occur in any artery of the body. When it appears in the heart arteries it is called coronary artery disease. With atherosclerosis, deposits called plaques or blockages form inside the artery. These narrow the arteries, causing less blood to flow through the blocked area. As the blood supply is decreased, the heart muscle receives less oxygen and is unable to perform its work efficiently.

Heart Attack

The term infarct means permanent damage to part of the heart muscle. Myocardial infarctions (heart attacks) occur when the blood supply to the heart muscle falls below a critical point. An infarct may be very serious, even fatal, or in some cases, it may be unnoticed by the patient, depending on the amount of heart muscle affected. It is important to note that the presence or absence of symptoms and their severity does not necessarily indicate the amount of heart damage. You can experience a massive attack with mild or no symptoms, and vice-versa.

Angina

Heart pain (angina pectoris) is often the first symptom of coronary artery disease. An angina attack usually occurs when the heart muscle is required to perform extra work, i.e., with exertion, stress or after a heavy meal. Because the artery is partially blocked blood flow is decreased and unable to meet this increased demand. When the pain cannot be controlled with medication, coronary artery surgery is considered.

Heart Valve Disease

The heart, as mentioned before, has four valves or doors: mitral, aortic, tricuspid and pulmonic. These valves normally function like little doors - opening widely to allow blood to flow through easily to the next chamber, and closing tightly to prevent blood in the heart from traveling in the wrong direction. People may be born with a malformed valve (congenital); sometimes they develop rheumatic fever during childhood with the same result or because of infection (endocarditis) or clots; and sometimes, for unknown reasons, a valve malfunctions. The two conditions of a malfunctioning valve are stenosis (tightness) and insufficiency/regurgitation (loose valve).

Stenosis refers to calcium (and other materials normally found in blood) accumulating on the leaflets (doors) that make up the valve. Stenosis prevents the leaflets from opening as widely as they once could.

The valve opening area where the blood must go through when the leaflets are open becomes progressively smaller. The problem is that the heart still must pump the same amount of blood through a smaller and smaller opening. Stenosis is one reason why valves are repaired or replaced.

Normally, when the valve leaflets close, they stay shut. This ensures that blood circulation through the heart travels in one direction only. When a valve does not stay closed, however, it is called valvular insufficiency or leakage. This valvular insufficiency may allow blood to travel the wrong way.

The two valvular dysfunctions (stenosis and insufficiency) can affect, separately, or simultaneously, any heart valve. Sometimes, more than one valve is affected and requires repair or replacement. Although valvular malfunction sometimes can be improved by closed heart surgery, most often valve surgery requires an open procedure. This means valve reconstruction, or more often, removing the diseased valve and replacing it with an artificial (prosthetic) valve made of metal, or with a tissue valve. Tissue valves can be human (homograph), cow (bovine) or pig (porcine).

Your surgeon will discuss with you the choice of prosthetic valves. Your ability to take a blood thinner called Coumadin (Warfarin) will affect the decision you and your surgeon make about the choice of prosthetic valve.

Aortic Aneurysm

A myocardial infarction (heart attack) heals by the formation of scar tissue. This scar is often very thin and as the heart muscle contracts, the scar gradually may begin to bulge outward, like a soft spot or bubble on a worn tire. Eventually, this can interfere with the heart's ability to pump blood. The bulging area, an aneurysm, can be removed by open heart surgery.

An aneurysm also can occur in the aorta. If surgery is recommended, the surgeon uses a dacron graft to support the weakened part of the aorta.

Tumors

In the rare circumstance of a tumor within the heart, surgery is needed if it grows large enough to obstruct blood flow. Such tumors are usually benign and, once removed, rarely recur.

CONGENITAL HEART DISEASE

Congenital heart disease denotes the condition of heart defects present at birth. The earlier such a defect is noted, the more severe it usually is. Sometimes, the defect is not discovered until adolescence or adulthood, when corrective surgery may be recommended. The common congenital heart defects in adults are:

(1) ventricular septal defect, (2) atrial septal defect, (3) coarctation of the aorta and (4) valve disease.

Ventricular Septal Defect

The wall of tissue separating the heart's two lower chambers - the right ventricle from the left ventricle - is the ventricular septum. Normally, this wall prevents blood in the left side of the heart (which is high in oxygen and low in carbon dioxide) from mixing with the blood in the right side (low in oxygen, high in carbon dioxide). An abnormal opening in the ventricular septum will cause an overall decrease in blood/oxygen levels due to the mixing of blood from the left and right ventricles. In addition, turbulence from the blood flowing through the defect can cause clots (emboli).

Sometimes after a heart attack involving the ventricular septum, a septal defect occurs, where in the tissue of the septum perforates, creating an opening between the left and right side. This defect can be repaired either by sewing the opening together or by sewing in a cloth or patch from your own pericardial tissue.

Atrial Septal Defect

The wall of tissue separating the two upper chambers of the heart - the right from the left atrium - is the atrial septum. Normally, this prevents blood in the left side of the heart (high in oxygen, low in carbon dioxide) from mixing with blood in the right side (low in oxygen, high in carbon dioxide). An abnormal opening in the atrial septum causes a decrease in oxygen in the blood, due to the mixing of blood from the two atria. There also can be irregularities of the heart beat, or shortness of breath. In addition, turbulence from the blood flowing through the defect can cause clots (emboli). Sewing the opening closed or sewing in a cloth patch, or a patch from your own pericardial tissue, usually restores normal circulation.

Coarctation of the Aorta

The aorta is a vascular tube arising from the left ventricle and continuing down, carrying blood through the body. Just beyond the branches which carry blood to the upper body, the aorta may have an abnormal narrowing, a coarctation. This often causes abnormally

high blood pressure in the upper body, but decreased blood pressure in the lower body.

This abnormality usually is corrected by cutting out the narrowed area, and either joining the aorta's two cut ends or putting a tubular cloth graft between them. Recovery is usually prompt, although the blood pressure may not fall to normal levels in the upper body for weeks or even months.

TESTS THAT DETECT AND EVALUATE HEART DISEASE

When your physician first suspects that you may have heart disease, you will be asked to undergo special tests to determine the nature and severity of your specific disease. Some of these tests are performed in pre-admission testing or as an outpatient. These tests can be divided into two categories: invasive and non-invasive. Invasive tests involve inserting small plastic tubes, catheters, into an artery or vein. Through these catheters dyes are injected, blood samples are removed, pressures are measured and electrical impulses are monitored. In non-invasive tests, the body is not penetrated by tubes, wires or needles. Both types provide different and important information.

NON-INVASIVE TESTS

Electrocardiogram (EKG or ECG)

The most common non-invasive test, an EKG, is usually done during routine physical examinations. Electrical activity, generated by the contracting and relaxing of the heart muscle, is measured and recorded on a strip of moving paper. To accomplish this, metal electrodes attached to a recording machine are placed on your arms, legs and chest. No electricity enters your body; there is no discomfort. The EKG is simply a measuring device.

Stress Electrocardiogram or Treadmill Test

Conventional EKGs are taken while you are at rest. The stress EKG is taken before, during and after a specific period of intense activity, such as pedaling an exercise bicycle or walking on a moving belt called a treadmill. Your blood pressure and pulse also are monitored, before, during and after the time you are performing this activity. Certain abnormalities may become apparent in stress testing that do not appear in a conventional EKG, as the heart requires more oxygen-rich blood during exercise than at rest.

Echocardiogram

An echocardiogram test is used to evaluate heart structures. The machine has a microphone-like device called a transducer, which is placed outside the chest wall, and emits ultrasonic waves. The machine translates the echoes of these waves into a picture on a piece of paper. The "echo" of your heart structure can then be measured.

Two dimensional echocardiography is a more advanced technique. This procedure records a diagram of heart motion and provides a video tape picture of the entire heart, its function and motion. Doppler echocardiogram and transesophageal echocardiograms are additional techniques that record blood flow inside the heart.

The echocardiogram tells your physician the thickness of the heart muscle, certain abnormalities in the structure and function of the heart valves and the heart wall, the presence of fluids around the heart (pericardial effusion), and whether there are tumors anywhere in the heart.

INVASIVE TESTS

Thallium Scan/Gated Pool Study

A thallium scan is similar to the stress electrocardiogram. This is considered invasive because, prior to the initiation of exercise, you will receive an injection of a special tracer substance, so that the outline of your heart and how it responds to activity may be recorded in a computerized fashion.

Cardiac Catheterization

By inserting and threading a thin tube (catheter) through an artery or vein in an arm or leg, injecting dye and taking x-ray pictures, the physician can gain important information unobtainable by any other way. Cardiac Catheterization usually is performed while the patient is awake, and as it causes some discomfort, medication to reduce anxiety and promote relaxation is given first. Sometimes, the patient is able to watch the television screen that the physician

monitors, observing the catheter's progress toward the heart. Catheterization is used to measure blood pressure and the oxygen content found in each of the heart's four chambers. It also can be used to withdraw blood samples from each part of the heart for testing. Moreover, it can also identify abnormal openings inside the heart, such as those present in congenital heart disease, and thereby measure the heart's ability to contract, determining its efficiency.

Coronary Angiography

Coronary Angiography frequently is performed along with catheterization; it is performed to detect if and where a coronary artery is blocked. A special non-toxic dye is injected via the catheter, and an x-ray of the dye's progress through the heart is recorded on motion picture film. Depending on where the dye is sent, various heart abnormalities can be detected. For example, by injecting dye into the main coronary arteries near the aorta's origin, the heart's entire arterial blood system can be seen. By passing the catheter through the aortic valve and injecting dye into the left ventricle, the physician can evaluate how well the heart muscles contract. Coronary Angiography also permits detection of blood clots within the heart.

TEE (Transesophageal Echocardiography Exam)

TEE (Transesophageal Echocardiography Exam) is a specialized type of heart examination in which physicians get sound wave (ultrasound) images from a device (transducer) placed in the esophagus behind the heart. The small device is mounted on the tip of a lighted tube and sends and receives waves reflected from the heart. The reflected sound waves are processed by a special computer that shows an image of the heart on a video monitor. TEE gives very high quality images of the heart that can not be obtained via the traditional echocardiogram.

SPECIAL BLOOD TESTS

Certain enzymes are released into the blood when particular organs or muscles - such as the heart - are injured. Special blood tests can identify the presence of these enzymes. Together with information from other tests, such enzyme measurements often can help indicate whether the heart muscle has been damaged. This knowledge can help your physician decide about the risks of surgery.

OTHER TESTS

In addition to the tests which specifically evaluate the heart, your doctor probably will want you to undergo other tests, to evaluate your total circulatory system. These may include pulmonary (lung) function studies; blood cholesterol and triglyceride levels; blood sugar tests; tests for electrolytes (sodium, potassium, chloride, magnesium, etc.) present in the blood; and various tests for thyroid function, renal function and blood clotting.

TEST RESULTS

After all tests are completed, your physician will be able to give you an evaluation of your condition including: (1) the nature and severity of the disease; (2) various means of treating it (i.e. with or without surgery: what kind of surgery); (3) any other condition that might influence the course of treatment. Feel free to ask questions, in order to clarify your understanding of tests results.

RISK FACTORS

RISK FACTOR REDUCTION

The development of atherosclerosis, which is the underlying cause of coronary artery disease (CAD), has been associated with certain risk factors. In addition to treatment of symptoms, it is important for you to identify your personal risk factors and take steps to reduce them.

Risk factors are generally divided into 2 categories: those that you cannot control, and those that you can.

RISK FACTORS YOU CANNOT CONTROL

Age: The incidence of atherosclerosis increases as we get older.

Sex: Males tend to develop atherosclerosis at a higher rate and at a younger age than women. However, this effect lessens as women complete menopause.

Heredity: A family history of CAD puts you at increased risk for developing it.

Although you cannot control these risk factors, it is especially important that you take steps to reduce any that you can change.

RISK FACTORS YOU CAN CONTROL OR CHANGE

Smoking: Smokers are at increased risk for developing atherosclerosis. If you smoke, **STOP**. It is usually helpful to attend a program that offers group support and behavior modification techniques. Ask your doctor about using nicotine patch or gum in addition to attend a smoking cessation program. A list of resources to help you stop smoking can be found in the Resource Section.

Elevated Serum Cholesterol Levels: Cholesterol levels greater than 200 are associated with increased risk of developing

atherosclerosis. Cutting down on saturated fats by avoiding high fat foods, substituting fat free or low fat milk and dairy products, changing cooking patterns (baking, broiling, roasting instead of frying) are ways to decrease fat. Information on following a “Prudent Diet” that stresses low fat, low cholesterol and low sodium intake is included.

High Blood Pressure and Diabetes: Both of these diseases are associated with development of atherosclerosis. If you have either disease, it is important that you take steps to control them. See your physician at regular intervals and follow recommendations regarding diet, medication, exercise and monitoring.

Obesity: Obesity places an additional workload on the heart. Attaining and maintaining your desired body weight is important.

Exercise: Exercise helps to maintain body weight, helps the heart work more efficiently and increases good cholesterol. Plan to do an activity you enjoy on a regular basis. Check with your doctor before starting an exercise program.

Stress: The role of stress in development of atherosclerosis is unclear, but it is advisable that you identify personal stressors and plan how to decrease them. You should also plan ways you can relieve stress.

RESOURCES

The American Heart Association

7272 Greenville Avenue
Dallas, TX 75231-4596
(800) AHA-USA1 (242-8721)
www.americanheart.org

National Heart, Lung and Blood Institute Information Center

Public Health Service
P.O. Box 30105
Bethesda, MD 20824
(301) 251-1222
www.nhlbi.nih.gov

SUPPORT GROUPS

The Mended Hearts, Inc.

7272 Greenville Avenue
Dallas, TX 75231
(214) 706-1442
Information Line: 1-888-HEART99 (1-888-432-7899)

The Coronary Club, Inc.

9500 Euclid Avenue, E-37
Cleveland, OH 44195
(800) 478-4255
(216) 444-3690