

What to expect after surgery

Before your transplant

When a donor heart becomes available the transplant coordinator acts as the link between the donor recovery team, the heart transplant team and recipient (you). Preparations for your surgery will take place according to the time set by the heart transplant surgeon and the donor team. Even though you may be moved to the operating room and given anesthesia, you will not undergo surgery until the donor team actually visually and manually inspects the donor heart and gives the final approval. Once that happens, the transplant team in the operating room can then begin the heart transplant surgery. You may need blood taken for tests. The blood can be taken from a vein in your hand, arm, or the bend in your elbow. It is tested to see how your body is before surgery. You may need to have blood drawn more than once. You may need a blood transfusion if your blood count is low. This is called anemia (a-nee-mia). You may also need a blood transfusion if you lose a lot of blood during surgery.

Risks

There are always risks with surgery. You may bleed more than usual, get an infection, have trouble breathing, get blood clots, or your body may reject the heart. There is also a risk that you may die during surgery. Medical personnel will watch you closely and treat these problems.

The heart transplant operation

What takes place in the operating room during your surgery? This section will discuss what goes on after a suitable donor organ has been identified, all laboratory testing has been completed, immunosuppressant medications have been given and you are on your way to the operating room. The operation usually lasts five to seven hours from beginning to end; but can last longer if you had previous open heart surgery or have a left ventricular assist device in place. When you reach the operating room, there will already have been a lot done to ensure that everything that is needed for the procedure is available and the room is prepared for a safe operation. You will be attached to heart and blood pressure monitors and the anesthesiologist will start an intravenous line.

You may be given medicine right before the surgery, which makes you feel sleepy and more relaxed. Caregivers help you get comfortable on the table.

A belt may be put over your legs for safety. If you get cold, ask for more blankets.

General anesthesia is given to keep you completely asleep and free from pain during surgery. It may be given as a liquid in your IV. Or, it is given as a gas through a facemask or a tube placed in your mouth and throat. This tube is called an endotracheal (end-O-tra-kee-ull) tube or "ET" tube. Usually you are asleep before the tube is placed into your throat.

Surgery, continued

Before your operation, much of your body hair will be shaved off, especially from your chest (if you're a man) and legs.

Your skin will be cleaned with a special antiseptic soap and water from your chin to your toes. This soap may make your skin yellow, but it is cleaned off later. Sheets are put over you to keep the surgery area clean.

In the meantime, the donor organ harvesting team has been transported to the hospital where the donor heart is located. Here the surgical team determines that it is an acceptable heart and carefully removes it from the donor's chest and places it in a special cold fluid for transportation. There is constant communication between the harvesting team and the transplant team to coordinate your operation with the timing of the heart's arrival.

When the new heart is on its way to Nebraska Medicine, the transplant surgeons begin preparing for the removal of your diseased heart from your chest. The surgeon will begin by opening the chest through an incision in the breast bone.

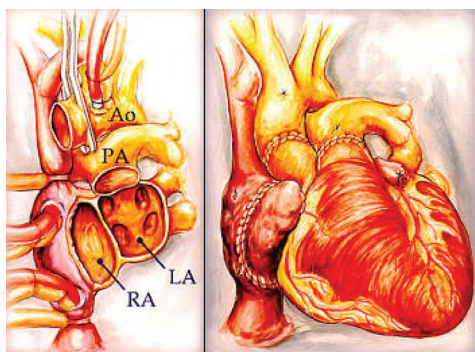
This incision will be just like that used for heart bypass surgery. No other incision is needed. Once the chest is opened, the outer layer of the heart (called the pericardium) is opened and your heart is separated from it.

When the new heart arrives, you will be connected to the heart-lung machine and it will take over the function of the heart and lungs for the rest of the procedure.

Surgery, continued

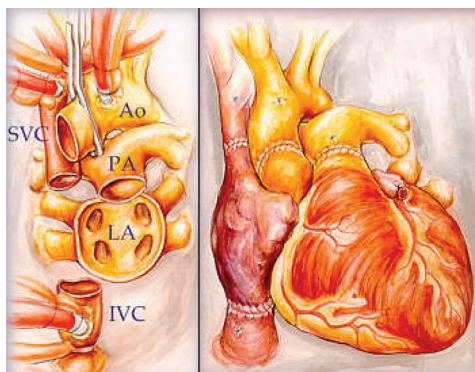
Orthotopic transplant

In an orthotopic heart transplantation, surgeons remove your failing heart except for the back walls of the atria, the heart's upper chambers. The donor heart is then attached to the remaining part of your heart. The backs of the atria on the new heart are opened and the heart is sewn into place. (see figure below)



The heart can also be attached using what is called the bicaval procedure. In this procedure the heart is

attached using the superior and inferior vena cava (SVC and IVC). (see figure below)



In either type of surgery, the new atrium is not connected to your nervous system. The right atrium contains important

tissue called the sinus or SA node. The sinus node is the normal pacemaker of the heart and it keeps your heart beating. It is normally under the influence of a branch of the nervous system called the autonomic nervous system. This system causes your heart rate to increase and decrease as your body's

needs change. Your native sinus node will not have any influence on your donor heart.

The donor heart will have its own sinus node that will be "denervated". This means that it will beat automatically but the heart rate will not be controlled by the nervous system. This does mean that your heart rate after surgery will generally be more rapid than usual and it will not be as able to speed up and slow down. This can affect the medications you are allowed to take and your body's response to position changes and exercise.

For example, adenosine is a medicine to use with caution. This medicine is given in certain types of stress tests as well as to slow down fast heart rhythms. Please inform any medical personnel that want to use adenosine for a fast heart rhythm or an adenosine stress test that they should monitor your heart closely, and consider decreasing the initial dose. Exercise modifications are discussed in chapter E.

After the heart is attached, surgeons then connect the blood vessels, allowing blood to flow through the heart and lungs. As the heart warms up, it begins beating. Surgeons check all the connected blood vessels and heart chambers for leaks before removing you from the heart-lung machine.

Then the clamp on the main blood vessel leaving your heart (aorta) is removed, which causes your heart to start beating normally. If it starts beating abnormally (fibrillating), your heart is given an electrical shock to correct the rhythm. The clamps are removed from your other blood vessels, allowing blood to flow normally to your new heart. The heart-lung machine is turned off, leaving your new heart to work by itself.

Surgery, continued

Your breastbone is fastened together using heavy steel wire. Your chest incision is closed with stitches.

Since your chest cavity is used to a large heart, tubes will be inserted to drain the fluid that will naturally collect in the “empty” spaces. These tubes and the rest of the recovery process will be discussed in the following sections.

Family visitation

During the transplant surgery, the operating room staff may be in touch with your family to give them an update on your condition. Your family will be taken to the surgery waiting area. Once the operation is over, the surgeon will meet with your family to tell them about your procedure. After surgery you are taken to the Intensive Care Unit (ICU) where you will be watched very closely.

Visitors may be limited immediately after surgery. However, as you begin to feel better, you can look forward to having company. Immediate family and/or significant others are welcome to see you after your surgery; however there are no more than two visitors at a time. Visitation may be further limited due to tests, procedures, nursing cares, or the promotion of rest needed for your recovery.

CONGRATULATIONS ON YOUR HEART TRANSPLANT!

THE HARDEST PART WAS THE FIRST TWO DAYS, AFTER THE TRANSPLANT. AFTER THAT I FELT BETTER AND BETTER EVERY DAY.”

– Nebraska Medicine patient

Post-operative care

INTENSIVE CARE UNIT

After surgery, you will be taken directly to the Intensive Care Unit. Here you will regain consciousness after the anesthetic wears off. Anesthetics wear off at different rates. That is why it is hard to say when you will wake up. It is not unusual for your mind and body to be uncoordinated at first. For example: at first some people can hear and open their eyes before they can move their arms or legs. Do not be alarmed, in a short time your body and mind will be back on the same track. You will be watched very closely by the doctors and nurses who have been trained to recognize any problems you could have with your new heart. Special equipment will be available to monitor your progress.

The following are the usual procedures your family can expect in the ICU:

HANDWASHING

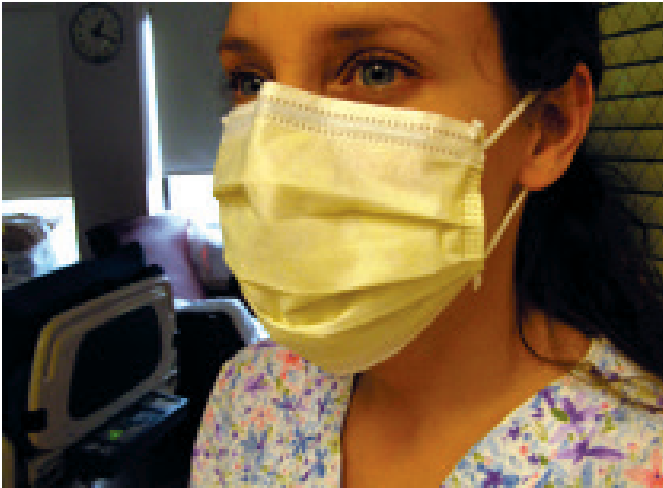
Everyone who enters your room will need to wash their hands or use the instant hand sanitizer. This protects you from potential infections due to lowered immunity from taking anti-rejection medications.



Surgery, continued

MASK

A mask needs to be worn anytime there is concern that a visitor may be ill. You will be required to wear a mask whenever you leave your room while in the hospital.



ENDOTRACHEAL TUBE AND VENTILATOR

A breathing tube (endotracheal tube) in your mouth goes by your vocal chords into your windpipe. It may feel uncomfortable and will keep you from talking. For the first 24 to 48 hours you will be on a breathing machine until the effects of anesthesia wears away and you begin to breathe on your own effectively. You will be asked to communicate with your nurse and family by nodding your head and/or writing messages on a tablet. The breathing tube will be removed when you no longer need help breathing.

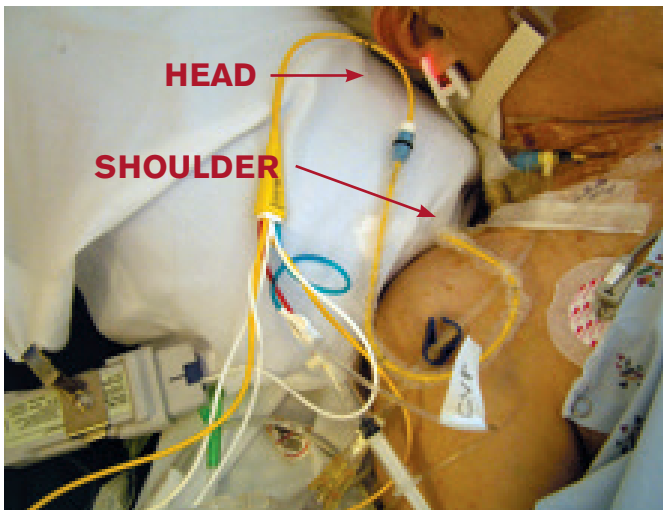


Above:
endotracheal
tube. Left:
ventilator.

Surgery, continued

PULMONARY ARTERY CATHETER AND MONITOR

This is one kind of central line catheter and is often called a Swan Ganz catheter, “swan”, or a pulmonary artery catheter. A pulmonary artery catheter is a thin tube put into a vein near your collarbone or in your neck. The tube is then guided through your heart and into your lungs. One end of this catheter is hooked to a machine called a monitor. The monitor shows numbers that tell caregivers how your heart is doing. Another part of this catheter may be used to give medicine. Cardiac output is measured on a monitor; this tells caregivers how much blood your heart is pumping out each time it beats.



FOLEY CATHETER

This is a tube that may be put into your bladder to drain your urine. The bladder is an organ where urine is kept. The catheter may make you feel like you have to urinate. Relax and the catheter will drain the urine for you. It is very important to monitor your urine output in order to make sure your kidneys are functioning normally. The doctors will remove this tube within the first 24 to 48 hours after surgery. When the catheter is taken out, you can urinate on your own.

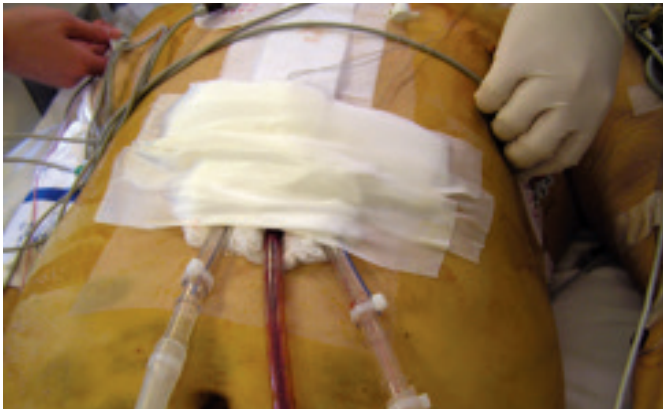
- Don't pull on the catheter because this will make you hurt or bleed.
- Don't kink the catheter because the urine cannot drain.
- Don't lift the bag of urine above the catheter. If you do this, the urine will flow back into your bladder. This can cause an infection.



Surgery, continued

CHEST TUBES

These are tubes that are put into your chest during surgery. Chest tubes remove air, blood or fluid from around your lungs and heart. The chest tubes are attached to a container and may be hooked to suction. This lets your lungs fill back up with air when you breathe. You will have two to three chest tubes coming out of your chest that will be draining fluids from your chest cavity from the operation. Once the fluid that is collected in the container decreases or stops, the doctors will order these tubes to be removed.



VITAL SIGNS

This includes taking your temperature, blood pressure, pulse (counting your heart beats), and respirations (counting your breaths). To take your blood pressure, a cuff is put on your arm and tightened. The cuff is attached to a machine which gives your blood pressure reading. Caregivers may listen to your heart and lungs by using a stethoscope (STETH-oh-skohp). Your vital signs are taken so caregivers can see how you are doing.

PAIN CONTROL



You will get out of bed and sit in a chair the next day after your surgery, depending on how well you are doing. You will have some discomfort where the incision was made to reach your heart. The nurse will ask you about your pain and ask you to rate it on a regular basis. If you have pain and are uncomfortable don't be afraid to ask for pain medication. Your nurse will help you determine the pain rating goal that is best for you. Reducing your immediate pain will allow your body to move more easily and help you recover faster. Most patients complain of soreness but don't have severe pain. The soreness comes from the surgical incisions and muscle spasms. Often good posture and moving your arms and shoulders will help this. If you have severe pain, the nurse will give you medicine. This medicine may be given, by mouth, or through your IV. Tell caregivers if the pain does not go away or comes back. Severe pain seldom lasts more than three days. Pain medicine may upset your stomach and make you feel like vomiting. Because of this, pain medicine and anti-nausea medicine are often given at the same time.

Surgery, continued

SURGICAL DRESSING

You will have a bandage over the chest incision for the first 24 hours. If there is no drainage, the bandage will be removed. You may have sutures (threads) on your incision. These wounds require about six weeks to heal completely. You must avoid lifting heavy objects during this time. The wound color will gradually change from purple to red to pink, returning to normal after several months. It is normal for the area around your incision to be numb after surgery. This should go away in less than a year.

Tell your doctor or caregivers if: you have tenderness over the incision (cut) in your chest; your stitches come apart or are red, swollen or have pus coming from them; or your bandage becomes soaked with blood.



PACEMAKER WIRES

You will have two wires below the chest incision coming through the skin. These special wires may have been put into your heart during surgery. These wires will be left in your chest in case they are needed. They may be covered with plastic to protect them. They may be attached to a temporary pacemaker if your new heart needs the help. These wires will be removed before you are discharged from the hospital.



Surgery, continued

BLOOD DRAWS

You will have blood drawn each day in the ICU in order to adjust the dosages of the anti-rejection medications and to monitor kidney, liver and other organ functions after transplant.



CHEST X-RAY

You will have a daily chest X-ray. An X-ray is a picture of your heart and lungs. Doctors use this to see how your lungs and heart are doing after surgery. It may also be used to look for signs of infection like pneumonia (new-moan-yuh).



WRIST RESTRAINTS

These are soft cloth bands used to tie your wrists to the sides of your bed. Restraints are used to keep you from pulling out your special tubes, IVs or the endotracheal tube. Caregivers will check on you often to make sure you are safe and all your needs are met while you are restrained. Restraints should only be used for a short time. They will be taken off when there is less chance that you will pull your tubes out.



Surgery, continued

LEG STOCKINGS

Stockings called “edema wear” or small leg covers that inflate and deflate may be placed on your legs while you are in bed. These devices prevent swelling and blood clots. Moving your legs and feet are also important ways to prevent clots.

COUGH AND DEEP BREATHING

This breathing exercise helps expand your lung and keep you from getting a lung infection after surgery. Coughing helps to bring up sputum (spit) from your lungs. You should deep breathe and cough every hour while you are awake even if you wake up during the night.

Hold a pillow against your chest when you cough to help lessen the pain. Take a deep breath and hold the breath as long as you can. Then push the air out of your lungs with a deep strong cough. Put any sputum that you have coughed up into a tissue. Take 10 deep breaths in a row every hour while awake.

After you are breathing on your own, you will learn to use a hand-held breathing exercise machine (incentive spirometer) to help prevent you from getting pneumonia.

Put the plastic piece (A) into your mouth and take a very deep breath. Hold your breath as long as you can. Then let out your breath. Use your incentive spirometer 10 times every hour while awake.

It may be uncomfortable to exercise the first few days after surgery but practicing will make it easier. It is not unusual to be short of breath after surgery. Remember, you received a lot of fluids during the operation. As you begin to move, your body will naturally get rid of the extra fluid so you may need to urinate frequently.

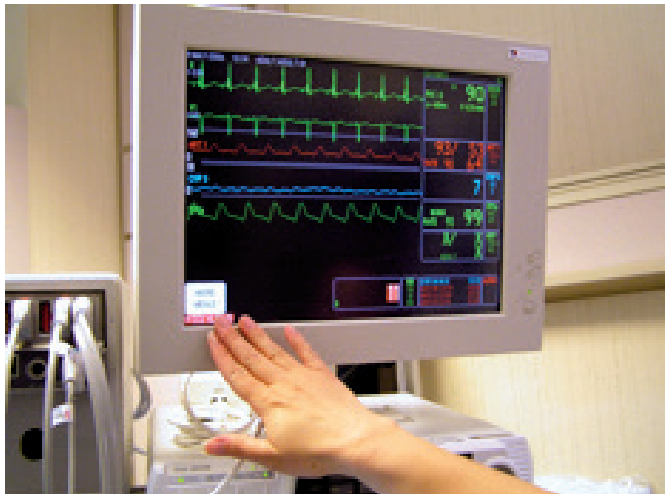


Left: breathing exercise with pillow. Right: hand-held breathing exercise machine.

Surgery, continued

HEART MONITOR

This is also called an ECG, or electrocardiogram (ee-lek-troh-KAHR-dee-oh-gram). Sticky pads are placed on different parts of your body. Each pad has a wire that is hooked to a TV-type screen. This allows caregivers to see a tracing of the electrical activity of your heart. Caregivers will watch the tracing closely for any abnormal heart beats. The heart monitor helps caregivers make sure that all is going well.



ARTERIAL LINE

This tube is also called an “art line” or an “A-line”. It is placed into an artery (blood vessel), usually in the wrist or the groin. The groin is the area where your abdomen (belly) meets your upper leg. The art line is attached to tubing with liquid in it. This liquid helps keep the tubing from getting plugged. The tube may be used for measuring your blood pressure or for taking blood.

BLOOD GASES

This test is also called an “ABG”. Blood is taken from an artery in your wrist or groin. Your blood is tested for the amount of oxygen, acids and carbon dioxide (di-ox-ide) in your blood. ABGs may be done if you are having trouble breathing or other problems caused by your illness.

IV



An IV is a tube placed in your vein for giving medicine or liquids. This tube is capped or connected to tubing and liquid.

Surgery, continued

PULSE OXIMETER (ok-Sim-e-ter)

This is a machine that tells how much oxygen is in your blood. A cord with a clip or sticky strip is placed on your ear, finger or toe. The other end of the cord is hooked to a machine. Caregivers use this machine to see if you need more oxygen.



EATING AND DRINKING

You may be able to eat when bowel sounds (stomach growling) are heard. Your caregivers will listen to your stomach for bowel sounds using a stethoscope. Ice chips are usually given first and then liquids (water, broth, apple juice or lemon-lime soda). If you don't have problems after drinking liquids, caregivers may then let you eat soft foods. Some examples of soft foods are ice cream, applesauce or custard. If you do OK with soft food, you may begin eating a regular diet. See N 1 – 3 for specific food safety information.



Daily weights

You will be weighed each day. Medical personnel compare your weight from day to day. This helps us see how much body fluid you have. When you lose too much body fluid you can become dehydrated (d-hi-dra-ted). If you have too much body fluid, you may have trouble breathing and get swollen ankles. Your body does not work well when it has too much or too little fluid. Diuretics help get rid of extra fluid your body or lungs may have collected. Getting rid of extra fluid in your lungs can help your breathing. Diuretics make you urinate more often. Diuretics can be given as a pill or in your IV.

Intake/output

Nurses need to know the amount of liquid you are getting. They also need to know how much you are urinating. Nurses often call this "I & O". You need to tell your nurse how much fluid you drink. Do not flush your urine down the toilet before it is measured and reported to your nurse.

Surgery, continued

Activity

Activity helps prevent complications and speeds your recovery. The nurses will help you get out of bed, usually the day of or a day or two after surgery. Your nurse will tell you when it is OK to get out of bed. Call your nurse before getting up until they tell you it is okay to be up on your own. When you are out of intensive care, you can take short walks in the hall. Eventually you can climb stairs and take brisk, longer walks to prepare for going home. If you ever feel weak or dizzy sit down right away, then call your nurse. You can have sponge baths right away. In a few days you will be allowed to have a shower and shampoo your hair.

Bowel movement

A bowel movement, (BM), is also called a stool. You will be given stool softeners to keep you from getting constipated. Constipated means it is hard to have a stool. Stool softeners make your BM softer so you do not need to strain.

Day/night confusion

You may not know when it is daytime or nighttime if you stay in ICU. This is common for patients staying in this unit. The lights are on all the time in the ICU, which may cause you to feel or act confused. Some of the medicines you are given may also cause hallucinations. This means you may see or hear things that are not real. This should go away when the amount of medicine in your blood is stable (level). You will become more aware of time when you are moved to a room on a regular floor. As you are able to rest, normal patterns of sleep, wakefulness and thought processes will return.

Denervation and its effects

When your new heart was put in your chest, the nerves could not be connected to it. You will be instructed to have a warm-up period before any exercise as well as a cool-down period so your heart rate can slowly return to normal since the nerves were cut during surgery. You may also experience a slight light-headed feeling when you make abrupt changes in position. Most heart transplant recipients achieve near normal function despite cardiac denervation. Most recipients are able to exercise normally, and some have eventually become capable of athletic achievements.

Hospital stay

The usual hospital stay after transplant averages about ten to fourteen days, but it depends on whether there are other complications; which could lengthen stay up to four weeks. You will transfer from the ICU after a few days. The remainder of your stay will be on the cardiac floor. However, if you live a long distance from the medical center, you may be asked to transition to the Lied Transplant Center to better prepare you for discharge and for going home. The nurses and pharmacists will work with you so that you can learn how to manage your own care. During that period and beyond, most patients have “good days” and “bad days” with overall progress and a gain in strength. It is not unusual to feel nervous or depressed about returning home. Sometimes these feelings are prompted by concerns about leaving the security of the hospital, with its expert medical team and equipment.

Surgery, continued

Home care, by comparison, may seem uncertain. Have confidence that your doctor won't send you home until he or she thinks you are ready. Before you leave the hospital, the team will explain how to take care of yourself. You will receive detailed instructions about your medications which must be taken every day.

You will not be on your own. The transplant team will continue to be a resource for you and you will stay in close contact with them. With this assurance, you can continue your recovery in the comfort of your own home.

EVERY EFFORT WILL BE MADE TO AVOID COMPLICATIONS, BUT THEY SOMETIMES DO OCCUR. THE MOST COMMON COMPLICATIONS ARE WOUND INFECTIONS, FEVERS, BLEEDING FROM THE INCISION AND REJECTION OF THE TRANSPLANTED ORGAN. YOU MAY OR MAY NOT EXPERIENCE ANY OF THEM.

This surgery may help you live longer and have a better quality of life. You will need to make changes in the way you live such as taking medicine, and seeing caregivers regularly, eating healthy foods and exercising.

I WILL NEVER FORGET WAKING UP
WITH A NEW HEART AND HOW
GREAT THAT FELT.

– *Nebraska Medicine patient*
