

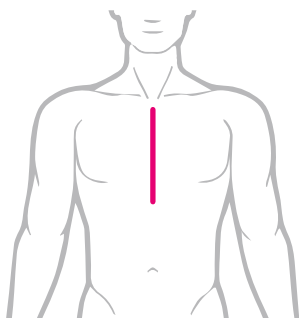


Minimally Invasive Cardiac Surgery

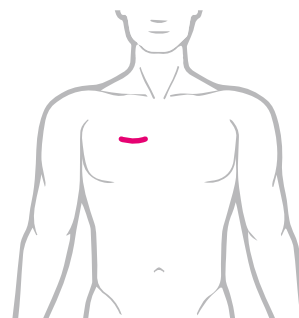
What is Minimally Invasive Cardiac Surgery (MICS)?

For some patients, cardiac surgical procedures can be done in a less invasive way, through small incisions between the ribs. These alternative approaches can promote a quicker recovery.

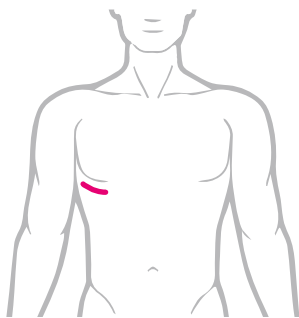
Conventional cardiac surgery requires the surgeon to make an incision in the front of the chest to divide the breastbone (sternum) for access to the heart. This is known as a sternotomy. Alternatively, Minimally Invasive Cardiac Surgery is performed through a small incision between the ribs on the right or left side of the chest. This is known as a mini-thoracotomy.



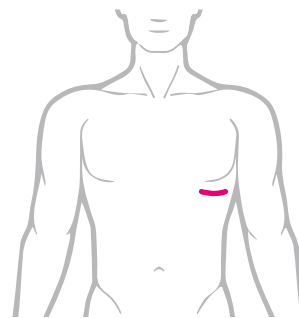
Conventional sternotomy incision site



Minimally invasive incision site for aortic valve repair/replacement



Incision site for mitral, tricuspid and atrial septal defect surgery



Incision site for minimally invasive coronary artery bypass grafting

The heart conditions that can be treated with Minimally Invasive Cardiac Surgery are:

- Mitral Valve Regurgitation
- Mitral Valve Stenosis
- Aortic Valve Regurgitation
- Aortic Valve Stenosis
- Atrial Septal Defect (ASD)
- Coronary Artery Disease

Not everyone is a candidate for MICS—this is a discussion you should have with your cardiologist and/or surgeon when you are referred for cardiac surgery.

Benefits of MICS

If you are a candidate for Minimally Invasive Cardiac Surgery, you will learn that there are many benefits that can help to speed up the recovery process after surgery. It can allow you to get back to your regular life sooner and gain confidence in your body. Some of the benefits include:

- A sternotomy involves dividing your breastbone in half to access your heart. MICS does not require this.
- With MICS, the incisions are smaller, allowing access to the heart through the space between the ribs.
- Mobility returns to normal sooner after surgery.
- If you use a mobility aid, such as a walker or cane, you will be able to use it immediately after MICS.



- Similar to a sternotomy, mini-thoracotomy incisions can be painful after surgery; however, rarely do patients require narcotic pain medicine after being discharged from the hospital.
- MICS allows patients to return to their normal lifestyle and activities as soon as they feel ready.
- Patients can start the cardiac rehabilitation program sooner after MICS.



Diagnostic Testing

After your doctor has referred you to a surgeon to discuss surgery you may need a few extra tests to help determine whether you are a candidate for Minimally Invasive Cardiac Surgery. Some of the common pre-operative tests are listed below.

TRANSTHORACIC ECHOCARDIOGRAM (TTE)

This is an ultrasound of your heart that is performed by placing a probe on the front of your chest and along your rib cage. The test allows a specially trained cardiologist to inspect the movement of blood through your heart chambers, and the efficiency of your heart muscle at pumping. They will also look for any abnormalities of the heart valves.



TRANSESOPHAGEAL ECHOCARDIOGRAM (TEE)

This test is a more detailed ultrasound of the heart. The ultrasound device is placed through your mouth into your stomach, like an endoscopy. This is performed as an outpatient appointment at the hospital, so medications can be given. The appointment can take several hours. The results can help the surgeon determine if your valve can be repaired or replaced.

COMPUTED TOMOGRAPHY (CT) SCAN

A CT scan is a diagnostic imaging test where numerous X-rays are taken of the chest. These images allow the surgeon to measure the distance from your heart to your rib cage. This ensure there is enough space for the surgical tools to reach your heart from the side of your chest. This test also allows the surgeon to assess blood flow through the large arteries in your body. This test is important to determine whether it will be safe for you to have MICS or if you will need conventional surgery (sternotomy).



CORONARY ANGIOGRAM

A specialized cardiologist and health-care team are required to perform this test. A catheter, inserted into an artery in your wrist or groin, delivers dye so images can determine if you have narrowing of the arteries that supply blood to the heart muscle. If you have significant blockages, you may need bypass surgery or a stent. If bypass surgery is needed, you may not be a candidate for MICS. This test is only performed at the hospital, and you will need a ride home following its completion.

CARDIAC MAGNETIC RESONANCE IMAGING (MRI)

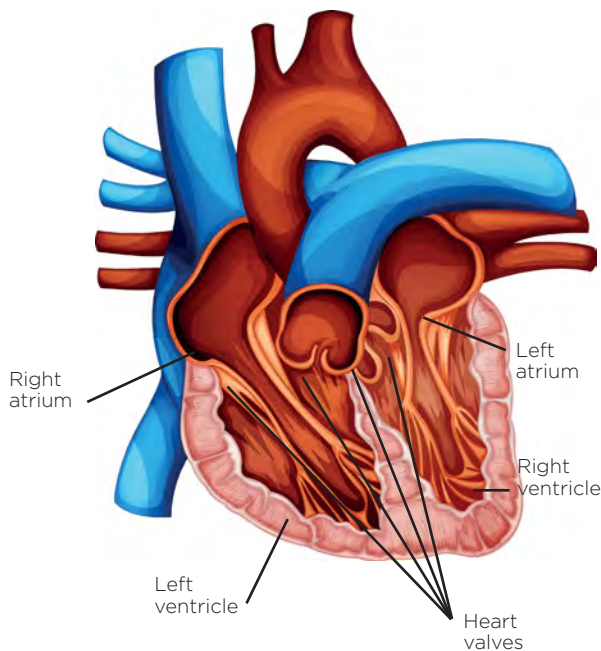
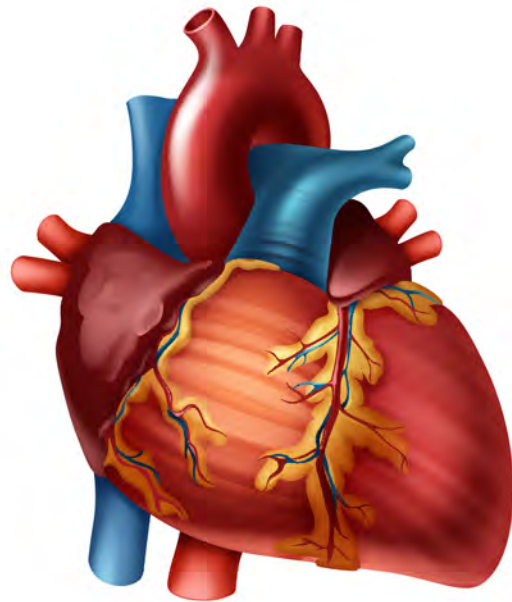
Cardiac MRI takes specialized images of your heart using magnets and radio waves. This allows the surgeon to examine the function of your heart muscle, the valves, and the blood vessels. You must lie still in an MRI for this test to be performed. The appointment can take a couple of hours.



Heart Valve Disease

The heart is an important organ. Its job is to pump blood to the lungs for oxygenation, before sending oxygen-rich blood to the rest of the body.

Your heart is approximately the size of your fist, has two upper chambers (atria) and two lower chambers (ventricles). It is made of strong muscle that pumps blood into arteries. The arteries then deliver blood to the lungs for oxygenation before delivering to the body. On average, your heart contracts 60-100 times per minute.



ATRIA

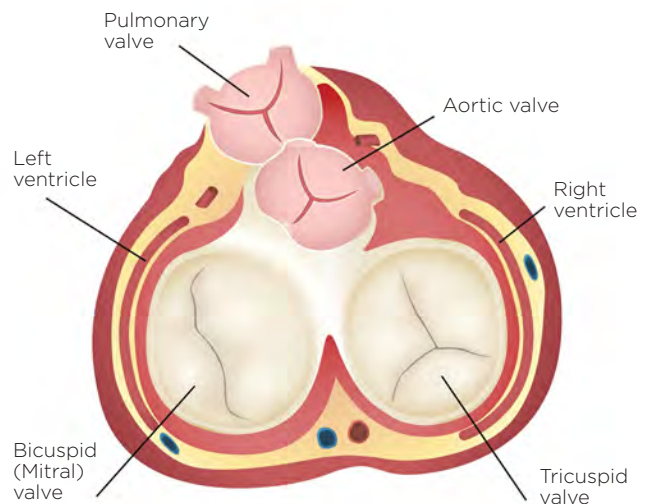
The right atrium collects blood from the body. The left atrium collects blood from the lungs, following oxygenation.

VENTRICLES

The ventricles are more muscular than the atria because they squeeze blood out of the heart. The left ventricle is thicker than the right because it must pump blood at a high pressure (your blood pressure) to the whole body. The right ventricle pumps blood at lower pressure into the lungs.

HEART VALVES

Each of the four heart chambers are separated by valves. Valves open to allow blood flow between chambers and close to prevent backflow. Any of these valves can become diseased, causing leakage or obstruction.



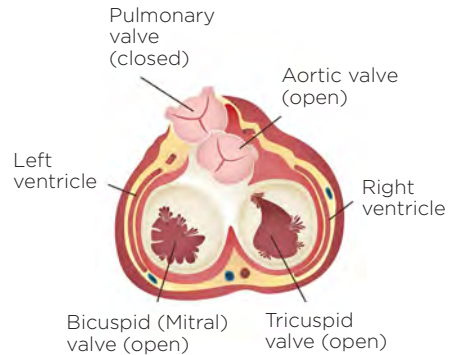
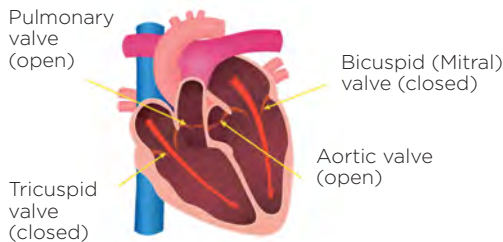
HEART VALVE DISEASES

Any of the heart valves can become diseased. If valve disease is severe, it can impact quality of life, and is associated with different types of symptoms. Valves can become damaged in a variety of ways:

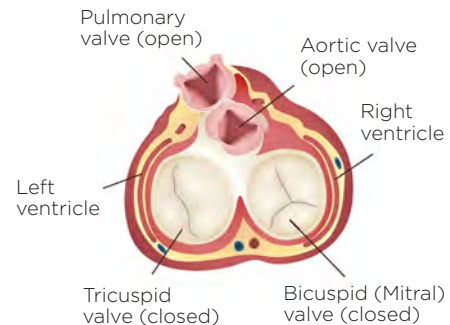
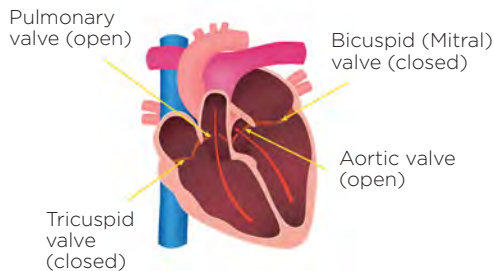
- Aging
- Infection (Endocarditis)
- Rheumatic Fever
- Birth Defect
- Heart Failure (muscle weakness)

Healthy valves open completely to allow blood flow, then close to prevent the blood from flowing backwards. If the valve becomes scarred or calcified, it will fail to open properly. This is known as **stenosis**. Valves may also leak, allowing blood to flow backwards. This is known as **regurgitation**.

DIASTOLE



SYSTOLE



SYMPTOMS OF VALVE DISEASE

- Tiredness
- Shortness of Breath (Dyspnea)
- Palpitations
- Irregular Heart Rhythm
- Chest Pain
- Swelling of Ankles/Feet (edema)
- Dizziness
- Fainting (Syncope)

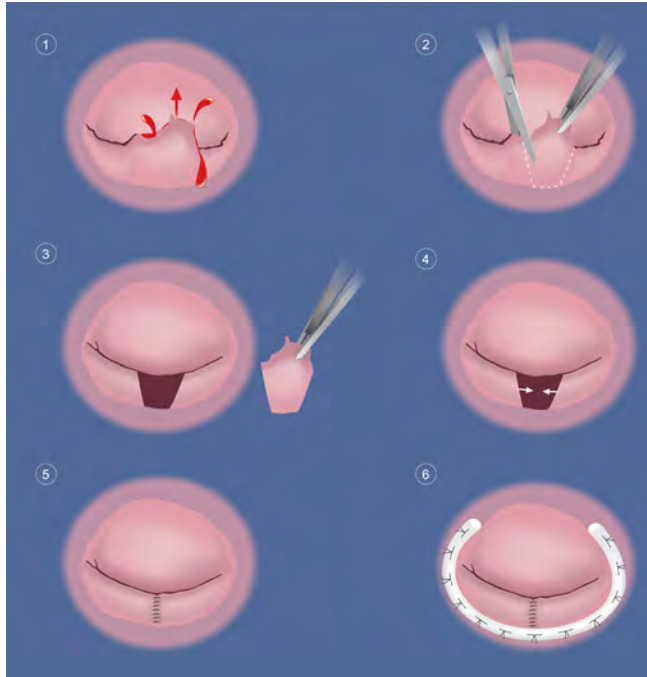
You may live many years with mild disease of your heart valves, with minimal or no symptoms. Symptoms of valve disease depend on which valve is impacted and how badly it is damaged. Sometimes valve-related symptoms can impact your ability to perform regular daily activities.

When your symptoms cannot be managed with medicine, or your heart function deteriorates, your cardiologist will refer you to a surgeon. Sometimes the heart valves can be repaired, but if not, it must be replaced. Your surgeon will review your diagnostic tests and discuss the options with you.



Valve Repair or Replacement

If you have heart valve disease and your symptoms can't be managed with medications, or if your heart function is reduced, your cardiologist will refer you to a surgeon. Sometimes heart valves can be repaired, and other times replacement is required.



REPAIR

If your surgeon is confident that your valve can be repaired, that is usually the preference. Successful repair depends on which valve is diseased and which portion of the valve is damaged.

The mitral valve is more likely to be repairable. To do this, a special ring, called an **annuloplasty**, is stitched around the valve to add structure and shape to the valve. Additional stitches and supporting chords can be added to restore function. At your preoperative consultation, your surgeon will explain how your valve will be repaired.

If you would like to watch a video of one of our surgeons performing minimally invasive mitral valve repair please scan the QR code or visit the following link:



https://youtu.be/wxNyt2k_3RU

REPLACEMENT

If your valve is too damaged and cannot be repaired, there are two kinds of replacement valves:

Mechanical valves are composed of man-made materials, like carbon and fabric. They are very durable, but require you to take a blood thinner (anticoagulation) for the rest of your life to prevent clot formation on the valve.

Tissue (also known as bioprosthetic or biological) valves are made from animal tissues, they aren't as durable as mechanical valves, typically lasting between 10-15 years, but they don't require anticoagulation.

The decision between a mechanical or bioprosthetic valve is made by you and your surgeon and is based on your age, lifestyle, health risk factors, and preferences.



Medtronic Futureband



Edwards Mitris Resilia Valve



Corcym Perceval Bioprosthetic Valve



Mechanical Valve Cryolife ON-X Valve

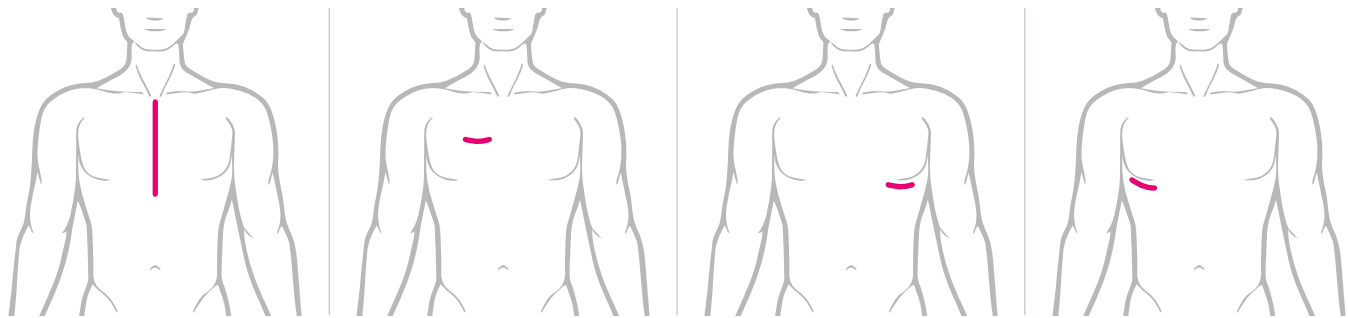
INCISION & SURGERY

Your incision site is determined by what part of the heart needs intervention. If your aortic valve requires surgery, the incision will be located on the front of your chest in the space between the second and third ribs.

If your mitral valve needs to be repaired, the incision will be in the space between the fourth and fifth ribs, closer to the right side of your chest.

Most minimally invasive operations also require an incision in your groin. This allows the surgical team to attach you to the heart-lung bypass machine.

The incisions will be made as small as possible to help facilitate recovery. They are much smaller than those required for conventional cardiac surgery.



Traditional
Open-Heart Surgery

Aortic Valve

Coronary Artery
Bypass Graft

Mitral Valve
Tricuspid Valve
Atrial Septal Defect Repair



Most patients arrive at the hospital on the morning of their operation, unless pre-admission is required. The surgical procedure can take anywhere from three to five hours. Your surgeon will perform two operations each day. After surgery, you will recover in hospital, typically for five or six days. The rest of your recovery will happen at home. Please review **Recovery** (page 10) for more information.

You will have follow-up appointments with your family doctor, cardiologist, and surgeon after you are discharged from the hospital. After valve surgery, another echocardiogram will be ordered to check how your new valve is functioning.

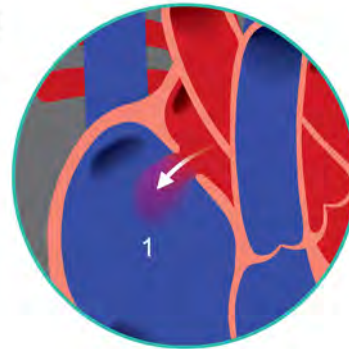
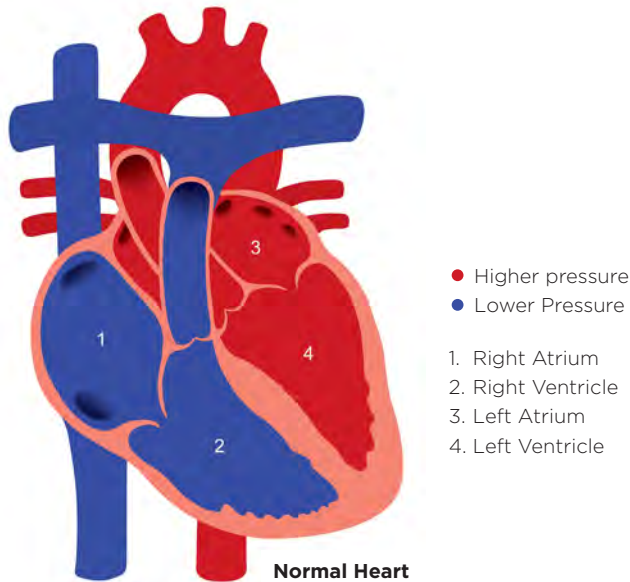
Atrial Septal Defect Repair

WHAT IS AN ATRIAL SEPTAL DEFECT (ASD)?

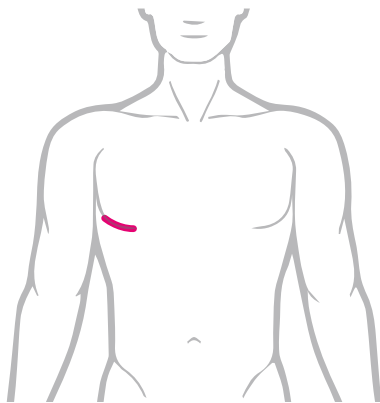
A newborn baby has a hole between the two upper chambers of the heart (atria) to allow blood to flow between the left and right side. This is important in the womb, when blood must be detoured from the non-functional lungs.

Normally, this hole closes after birth, but in some people it persists and is known as an atrial septal defect (ASD). It is often detected as a murmur during a physical exam or through routine testing. Sometimes an ASD is large enough that it can cause a reduction in heart function, or symptoms of shortness of breath.

ASD repairs can often be performed via device insertion, with interventional cardiology. This is a day procedure, which avoids the need for surgery. If the plugging device cannot close your ASD, the defect can be patched with Minimally Invasive Cardiac Surgery.



Atrial Septal Defect (ASD)
Oxygen-rich blood from the left atrium (higher pressure) leaking to right atrium heart



You will need to undergo a few diagnostic tests before meeting with the surgeon to ensure you are a candidate for minimally invasive ASD repair.

The incision for this surgery is on the right side of your chest between the ribs. There will also be another smaller incision in your right groin so your surgeon can support you on the heart-lung machine (cardiopulmonary bypass).

Patients undergoing this surgery will be admitted to the hospital for three to five days to recover after surgery. Please refer to **Recovery** (page 10) for more information about the recovery process.

Postoperative Complications

If you have questions about your recovery, you can call your family physician, cardiologist, or surgeon. If you require assessment after hours, attend a walk-in clinic or emergency room. For urgent concerns, call 911. Typically, your surgeon will call you with an appointment for follow-up at six to eight weeks after surgery. You will need to make an appointment to see your family doctor one week after discharge.

WOUND INFECTION

It is important to inspect your chest and groin wounds daily. Although normal healing is associated with some redness, the wounds should be dry. If you notice worsening redness, with warmth and associated oozing and drainage, your wound may be infected and should be assessed.

LUNG INFECTION

After heart surgery you are at increased risk for pneumonia. Getting up and moving, along with deep breathing and coughing exercises, can help prevent this. If you start developing a productive cough, have difficulty breathing, have a fever, or feel short of breath while at rest, you should seek medical attention.

HEART INFECTION (BACTERIAL ENDOCARDITIS)

After heart valve surgery, you are at higher risk of an infection to your heart (bacterial endocarditis). This infection is localized to the heart valves. To prevent this:

- No routine dental work (cleaning) for at least six months after surgery
- If you need emergency/urgent dental work tell your dentist you have had heart valve surgery
- Maintain good dental hygiene
- You may need an antibiotic dose before going to the dentist after valve surgery

HEART RHYTHM

It is common to have heart rhythm changes after surgery. Most resolve on their own, but if you feel like your heart is beating rapidly or irregularly, and this fails to resolve, you should be assessed by your family physician, cardiologist or surgeon.

HEART FAILURE

It is important to weigh yourself daily to monitor for fluid buildup. If you gain more than 1.5kg (3.3lbs) over several days, have swelling in your ankles, find it difficult to sleep lying flat, and are unable to catch your breath after minimal exercise, you will need to be assessed.

STROKE

A stroke happens when blood flow to your brain is interrupted. The major signs of a stroke are:

- Weakness/numbness to one side of the body
- Inability to form words
- Confusion
- Loss or sudden changes to vision
- Dizziness and lack of balance
- Sudden severe headache

If you notice any of these changes, it is important to call 911 and let the operator know that you may be having a stroke.

GI BLEED

After surgery, there is a risk of internal bleeding. If your stool is bright red, dark red, or black, you may be having a GI bleed. Seek urgent medical attention to check if you are bleeding in your stomach or intestines.

Recovery

Your heart condition may have impacted your pre-surgical life and activity level. Once your surgery is complete, you may begin feeling better, but full recovery of your energy level may take six months or longer. Keep in mind your body is healing and needs both rest and exercise to heal and strengthen. Take time to increase your activity as your energy levels allow, knowing that some days will be better than others. Talk with your family doctor, cardiologist, and surgeon at follow-up to determine a safe date for return to work.

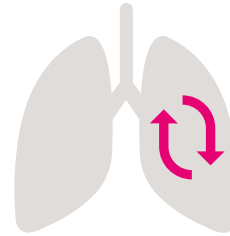
INCISION CARE

In the hospital, your nurse will inspect your incisions regularly for signs of complication. There may be small tapes left on your incision when you go home. These may fall off naturally within five days, but if they don't, gently remove them. Before touching your incisions, be sure to wash your hands. Showers are permitted, but your incision should not be submerged in a bath until six weeks. Clean your incisions with mild soap and water and gently pat them dry. Refrain from using lotions, powder, or cream on your incisions because these can irritate your skin. It is normal for your incisions to be slightly reddened, tender to the touch, feel numb, and be itchy and tight. A small amount of clear drainage can be common. If your wounds become bright red, warm to the touch, extremely tender, or swollen with increased drainage, call your family doctor or surgeon.

PAIN CONTROL

It is important to get moving immediately after surgery so you can build strength in preparation for returning home. After surgery, you will be prescribed pain medicine and the anesthesiologist may also insert a special IV that will inject a numbing agent into your chest wall. This will help control pain for the first days after surgery.

You will be asked to rate your pain by the health care team on a 0-10 scale throughout your stay in the hospital, where 0 is no pain and 10 is the worst pain you can imagine. As each day goes by, your pain will subside and you will only need over-the-counter pain medication by the time you are discharged home.



DEEP BREATHING & COUGHING

Deep breathing and walking will help decrease your chance of pneumonia and blood clots. That's why these are your most important jobs while you are in the hospital.

Your physiotherapist and nurse will remind you, but it is your responsibility to practice your breathing exercises. The goal is for you to take 10 deep breaths and cough every hour.

CONSTIPATION & YOUR BOWELS

You may not have much of an appetite the first few days after surgery, which is normal. You will be given a laxative to help your bowels to start working. Water, fibrous foods, and walking can help. Blood in your stool (bright red or black) is never normal, and you should tell your healthcare team if you experience this at any point after surgery.

NUTRITION

Your body will need more protein to help you heal. It is common to feel no hunger after surgery, but as you regain your appetite, it may be helpful to eat smaller, more frequent meals. Aim to eat foods with more protein, including meat, fish, poultry, eggs, milk, legumes, and nuts. Also remember to drink water to help with digestion.

RESTING

Sleep is important for your body and its healing process. Try to sleep at least eight hours, but you may find you need more. You will then wake up ready to get moving. If you feel fatigued during the day, take a rest.



ACTIVITY & EXERCISE

Because your surgeon didn't need to perform an incision through your breastbone, your mobility will return earlier.

You may use your arms to help reposition yourself in bed, and you can extend them to reach for things. You may feel discomfort at the side of your chest or at your right groin, where your incisions are.

Walking is the best exercise for you after surgery. Your goal should be to walk 30-40 minutes daily. This will help you breathe deeper and improve your lung function.

When your strength returns, you may begin to reintroduce other activities in your life. Pace yourself and take breaks if you feel tired. If you have questions about resuming certain activities, check with your surgeon.

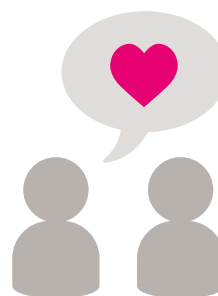
DRIVING & TRAVELLING

In most cases after minimally invasive surgery, you can resume driving in 10 days, but please ask your surgeon. This decision is based on several factors, including the type of surgery, your heart function, and what type of driver's license you hold.

If you are a commercial driver, you are not allowed to drive until Alberta Transportation reviews your case. You will need to contact Alberta Transportation to see what is required for your return to work.

SEXUAL ACTIVITY

You can be sexually active as soon as you and your partner feel ready. Sexual activity demands the same amount of energy as climbing the stairs. Your walking routine will help you get into shape for this.



SOCIALIZING

Your family and friends will be an important support during your recovery, but remember, they may be feeling tired from the extra time spent helping you. Encourage your loved ones to rest and spend time on themselves. Also, do not forget to thank them for their help.

EMOTIONS & STRESS

Surgery is a major life event that involves not only changes to your body physically, but also changes your routine. Often there is a reduction in independence. For these reasons, post-operative depression is common, and can happen to anyone at any point in their recovery. If you find your mood is low, your family doctor can help.



ALCOHOL

Consuming any more than small amounts of alcohol while you are healing is not recommended. Alcohol can slow down your recovery and interfere with medications, such as pain medicine, sleeping pills, and blood thinners

SMOKING

Everyone is aware of the dangers of cigarette smoke in healthy people. You have just had heart surgery and your lungs have been affected during surgery. If you continue to smoke, you are at risk for lung infections. Alberta Quits has many great tools to help.

CANNABIS

Just like smoking cigarettes, inhaling marijuana can negatively impact your lungs during recovery. Cannabis is commonly used to help manage chronic pain, reduce anxiety, and promote sleep, which are all important during your recovery. If you choose to use cannabis, consider using edibles, rather than inhaled options. It is best to discuss this with a medical professional.



BACK TO WORK

Talk with your family doctor and surgeon about your return-to-work plans. If your job is physically demanding, you may need to begin with lighter duties. The timing of your return depends on how quickly you heal, how well you are feeling, the state of your energy level, and the type of work you do.

FOLLOW-UP VISITS

You will need to make appointments with your family doctor, cardiologist, and heart surgeon after your discharge. Your discharge information will have timelines, outlining when these appointments should occur. The first doctor you will see after going home is your family physician. It is important to make that appointment one or two days after discharge.

CARDIAC REHABILITATION

Every patient who undergoes heart surgery is referred to the Cardiac Rehabilitation program, which incorporates a cardiac assessment, medication review, exercise program, diet, and lifestyle classes. This structure helps with your recovery, promoting a heart healthy lifestyle. This is not a mandatory program, but is valuable, and provides individualized care during your recovery. Your support person can also be included in the program, allowing you to learn together. Some rehab programs come with an expense. If finances are of concern, please let your healthcare team know prior to discharge.



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