

*If you have any questions, ask your physician or nurse.*

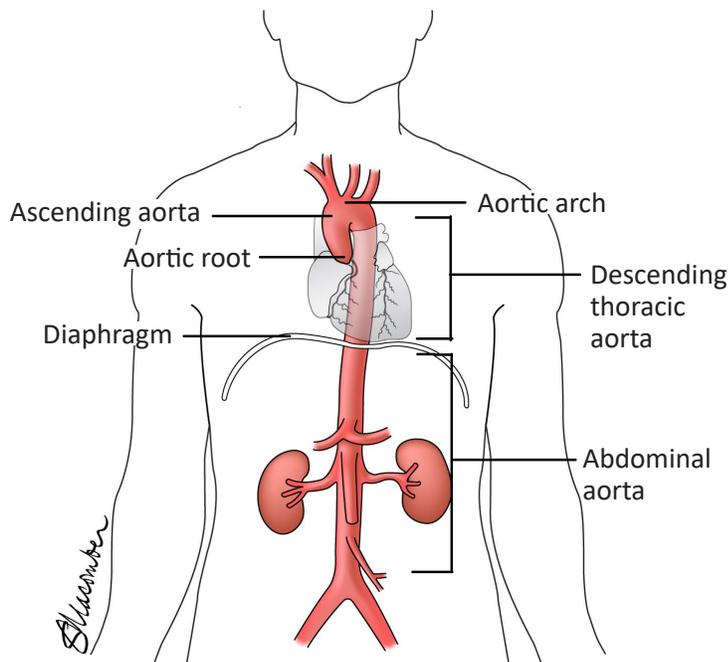
## Cardiac Surgery: Aortic Aneurysms

Your healthcare team may have discussed the need for aortic aneurysm surgery with you. This brochure will help you better understand aortic aneurysm surgery and what to expect. It will explain what an aortic aneurysm is and the surgery to treat it.

### The aorta

Blood vessels are tube-like channels that carry blood throughout your body. There are 2 types of blood vessels: veins and arteries. Veins carry blood to your heart. Arteries carry oxygen-rich blood and nutrients from your heart to the rest of your body. The aorta is the largest artery in your body.

**Figure 1. Normal aorta**



The **aorta** starts at the lower left chamber (ventricle) of your heart. It connects to the left ventricle at the **aortic root (Figure 1)**.

The left ventricle is the main pumping chamber of the heart. It sends blood to the aorta through the aortic valve.

Blood travels up the **ascending aorta**, along the **aortic arch** and down into the **descending thoracic aorta** in the chest. It then flows into the **abdominal aorta**, the part of the aorta that passes through the diaphragm.

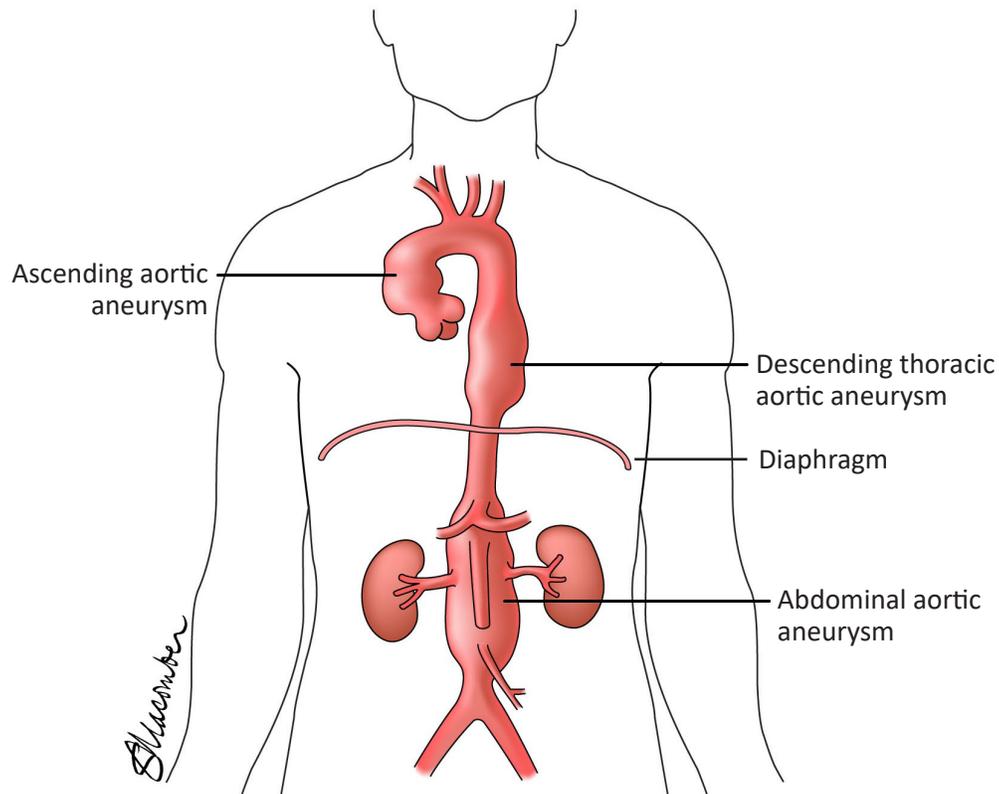
The aorta has many branches that supply blood to all parts of the body.

### Aortic aneurysm

An aneurysm happens when the wall of the aorta weakens. The pressure of the blood flowing through the vessel creates a bulge at the weak spot. This is much like the way an overinflated inner tube can cause a bulge in a car or bike tire. The bulge usually starts small. Over time, as the pressure continues, it can grow. If an aneurysm is not repaired, it can rupture (burst) and lead to a large amount of bleeding in a very short time. A ruptured aneurysm can be a life-threatening emergency.

Figure 2 shows different types of aneurysms. Ascending and descending thoracic aortic aneurysms can happen in the aorta above the diaphragm, in the chest. An abdominal aortic aneurysm can happen in the aorta below the diaphragm, in the belly.

**Figure 2. Aortic aneurysms**



### **Causes**

Common causes of an aortic aneurysm include:

- Atherosclerosis (deposits of fat, cholesterol and calcium inside the artery)
- Connective tissue disorders (affecting muscle or skin), such as Marfan syndrome
- Tear in the lining of the aorta (aortic dissection)
- Bicuspid aortic valve (defect of the heart valve)
- Inflammatory disease
- High blood pressure
- Trauma to the chest
- Family history of aneurysms

### **Symptoms**

Most people with aortic aneurysms have no symptoms. Chest and/or back pain are the 2 most common signs of larger aneurysms. Other symptoms may include:

- Sweating
- Dizziness
- Hoarseness

- Rapid breathing
- Difficulty swallowing
- Feeling cold and clammy
- Feeling like your heart is racing

## Aortic surgery

Treatment for an aortic aneurysm depends on the location and extent of the problem. Most often, someone with an aortic aneurysm will need surgery to replace or repair the:

- Affected heart valve (if needed)
- Part of the aorta with the defect

The surgeon may use a hollow, man-made tube called a graft to replace the weakened aortic wall. This graft is made out of Dacron<sup>®</sup>, which is a very strong material and heals well in the body.

There are different ways to repair an aortic aneurysm. The method that your surgeon chooses may depend on:

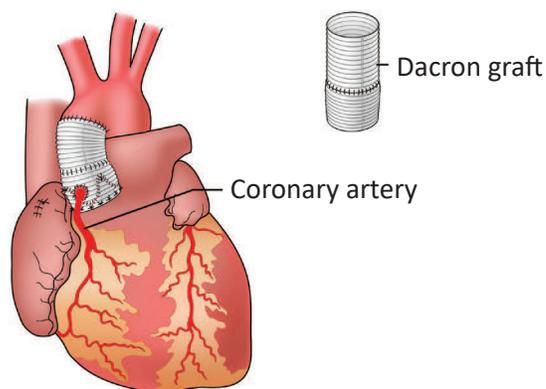
- Size of the aneurysm
- Location of the aneurysm
- How fast the aneurysm is growing
- Whether other surgeries need to be done at the same time

Your surgeon will talk with you about the best treatment option for you.

### ***Aortic root replacement***

The surgeon will treat an aneurysm of the aortic root by replacing that part of the aorta with a Dacron graft. The coronary arteries that come from the aortic root are re-implanted on the side of the graft (Figure 3).

**Figure 3. Aortic root replacement**



Your surgeon may sometimes be able to repair, rather than replace, your aortic valve. They can do valve-sparing aortic root replacement surgery by:

- Reshaping the valve
- Tightening the valve
- Making the valve more stable

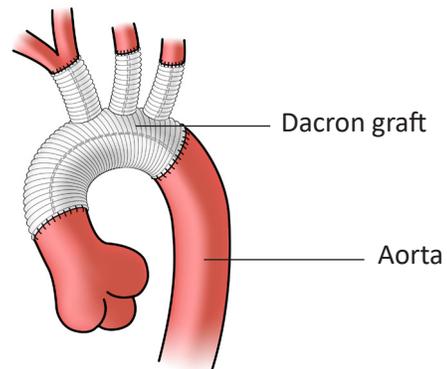
If your surgeon cannot repair the aortic valve, it will be replaced.

### ***Aortic arch replacement***

If the problem is in your aortic arch, the surgeon may need to replace it with a Dacron graft (Figure 4).

During this surgery, The surgical team will stop blood flow to your brain for a short time. They will protect your brain by cooling your body during the surgery. This helps reduce the risk of stroke or damage to your brain.

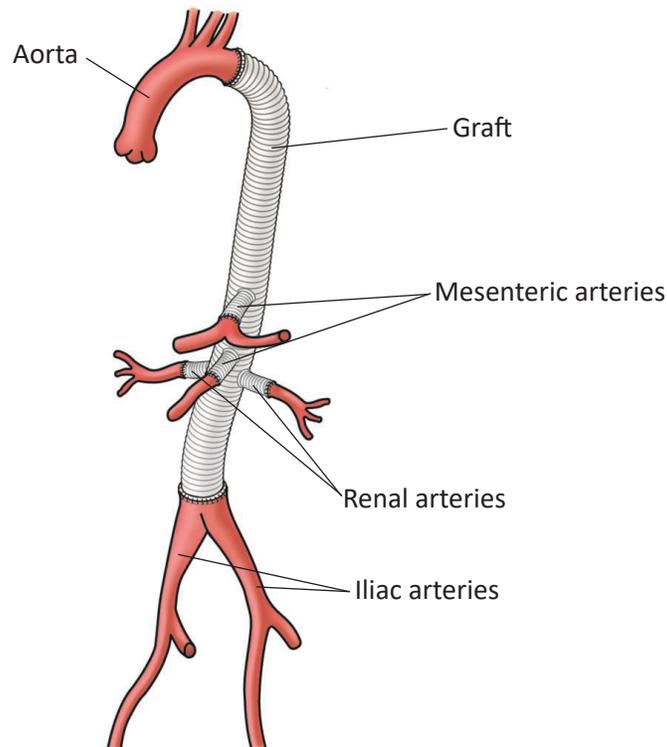
**Figure 4. Aortic arch replacement**



### ***Descending thoracic aorta and thoracoabdominal aorta replacements***

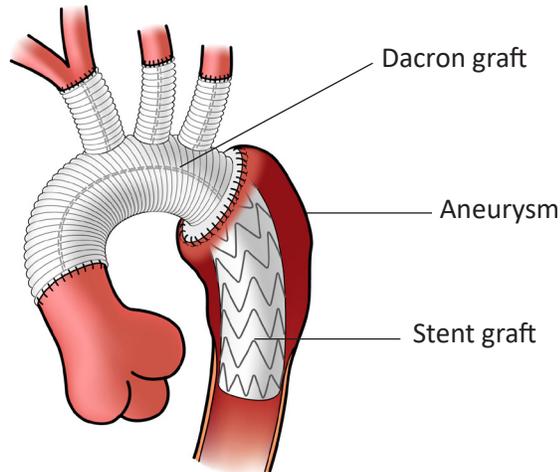
When an aneurysm extends from the chest into the abdomen, it is called a thoracoabdominal aortic aneurysm. The surgeon may use a Dacron graft to repair an aneurysm in the descending thoracic aorta. They will use a longer Dacron graft to repair this kind of aneurysm (Figure 5).

**Figure 5. Thoracoabdominal aneurysm repair**



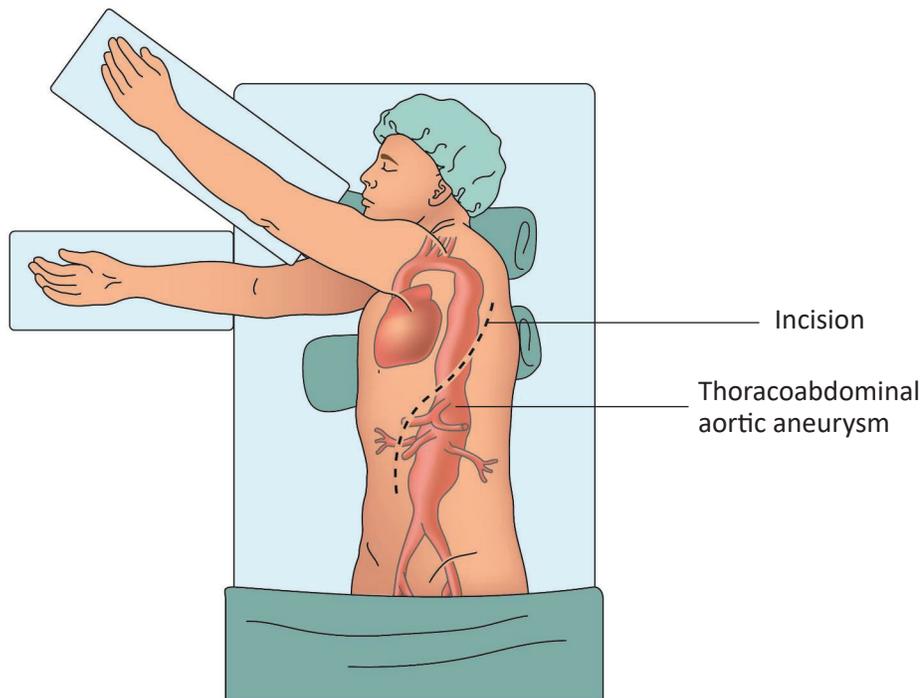
The surgeon will use a type of surgery known as the elephant trunk procedure to treat complex aneurysms involving both the ascending aorta and descending aorta (Figure 6).

**Figure 6. Elephant trunk procedure**



For descending thoracic aorta or thoracoabdominal aorta surgery, the surgeon will make the incision (cut) in the left side of your chest (Figure 7). They will separate the muscles between your ribs (thoracotomy) to get to the aorta. The surgeon may also make an incision in your groin if they will be using a heart-lung machine. After they repair your aorta, they will close your chest and use stitches that dissolve as you heal. They may put a drain in your back to remove spinal fluid to reduce pressure in the spinal cord.

**Figure 7. Surgical incision**

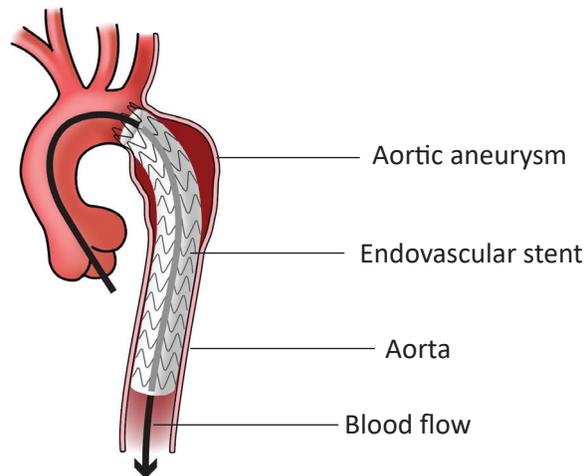


### ***Thoracic endovascular aortic repair***

Endovascular (inside the blood vessel) surgery, the surgeon will make only small incisions in your groin. The surgeon uses special instruments and X-rays to guide the repair through your femoral artery (large artery in the thigh) into the aorta. They may use a stent graft to repair a descending thoracic aortic aneurysm. The surgeon puts this type of graft inside the damaged aorta and expanded to fit snugly in place (Figure 8).

The surgeon then closes the incisions with stitches that dissolve as you heal.

**Figure 8. Thoracic endovascular aortic repair**



### **Aortic surgery**

Every surgery has some risks. The amount of risk depends on factors such as your age and overall health. Aortic surgery risks include bleeding, infection, and lung or heart problems. In rare cases, stroke or spinal cord injury can happen. Your surgeon will talk with you about your individual risks in more detail.

Please talk with your cardiologist or surgeon if you have any questions or concerns. Call Northwestern Medicine Bluhm Cardiovascular Institute at 312.NM.HEART (312.695.4965), TTY: 711.