Cardiac Surgery: Aortic Aneurysms

Your healthcare team may have discussed the need for aortic aneurysm surgery with you. To better understand these discussions and what to expect, this brochure will explain:

- Blood flow through the aorta
- Aortic aneurysm
- Aortic surgery

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

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 begins at the lower left chamber (ventricle) of your heart. It is joined to the left ventricle at the aortic root (Figure 1).

The left ventricle, the main pumping chamber of the heart, 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 occurs 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 similar to 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 in size. 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 are located in the aorta above the diaphragm, in the chest. An abdominal aortic aneurysm is located in the aorta below the diaphragm, in the belly.

**Figure 2. Aortic aneurysms**

![Diagram of aortic aneurysms](image)

**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, surgery is needed to replace or repair the:

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

A hollow man-made tube called a graft may be used to replace the weakened aortic wall. This graft is made out of Dacron®, which is very strong and heals well in the body.

There are different techniques to repair an aortic aneurysm. The method that your physician 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 physician will talk with you about the best treatment option for you.

**Aortic root replacement**
An aneurysm of the aortic root is treated by replacing that portion 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. Valve-sparing aortic root replacement surgery may be done by:

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

If your aortic valve cannot be repaired, it will be replaced.

**Aortic arch replacement**

If the problem is in your aortic arch, it may need to be replaced by a Dacron graft (Figure 4).

During this surgery, blood flow to your brain may be stopped for a short period of time. Your brain is protected by cooling your body during the surgery. This helps reduce the risk of stroke or damage to your brain.

**Descending thoracic aorta and thoracoabdominal aorta replacements**

A Dacron graft may be used to repair an aneurysm in the descending thoracic aorta. When an aneurysm extends from the chest into the abdomen, it is called a thoracoabdominal aortic aneurysm. A longer Dacron graft is needed to repair an aneurysm of this type (Figure 5).
The elephant trunk procedure used 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, a drain may be placed in your back to remove spinal fluid to reduce pressure in the spinal cord.

The incision will be in the left side of your chest (Figure 7). The muscles between your ribs are then separated (thoracotomy) to access the aorta. An incision also may be made in your groin if a heart-lung machine is used. After your aorta is repaired, your chest is closed, and your incision(s) will be closed with stitches that dissolve as you heal.

**Figure 7. Surgical incision**
**Thoracic endovascular aortic repair**

Endovascular (inside the blood vessel) surgery is a procedure that requires only small incisions in your groin. The physician uses special instruments and X-rays to guide the repair through your femoral artery (large artery in the thigh) into the aorta. A stent graft may be used to repair a descending thoracic aortic aneurysm. This type of graft is placed 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

![Diagram of thoracic endovascular aortic repair](image)

- Aortic aneurysm
- Endovascular stent
- Aorta
- Blood flow

**Aortic surgery risks**

Every surgery carries 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 may occur. Your surgeon will discuss your individual risks with you in more detail.

We encourage you to discuss questions or concerns you have with your cardiologist or surgeon. Call 312.NM.HEART (312.695.4965) to reach Bluhm Cardiovascular Institute, TTY for the hearing impaired 312.926.6363.