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:

- Aortic aneurysm.
- Aortic dissection.
- Aortic aneurysm surgery.

Aorta

First, it is helpful to learn more about the blood vessels and the aorta. Blood vessels are tube-like channels that carry blood throughout the body. There are two types: arteries and veins. Veins carry blood to the heart. Arteries carry oxygen-rich blood and nutrients from the heart to the rest of the body. The aorta is the largest artery in the body.

The aorta begins at the lower left chamber (ventricle) of the heart. It is joined to the left ventricle at the aortic root.

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. The aorta then passes through the diaphragm into the abdominal aorta.

The aorta has many branches that supply blood to all parts of the body (see Figure 1).

Figure 1. Normal Aorta

If you have any questions, ask your doctor or nurse.
**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 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 is a life-threatening condition.

Figure 2 below shows different types of aneurysms. Ascending and descending thoracic aortic aneurysms are located in the chest above the diaphragm. 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 of an Aortic Aneurysm**

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 of an Aortic Aneurysm
Most aneurysms have no symptoms. But, chest and back pain are the two 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 Dissection
The wall of the aorta is made up of 3 layers. When the inner layer of the aorta tears, it is called an aortic dissection (see Figure 3). The inner tear causes bleeding into the other layers of the vessel. As the bleeding increases, the layers of tissue separate and weaken the aortic wall. This can lead to an aneurysm which can rupture. The tear can start anywhere along the aorta from the beginning of the ascending aorta downward to the descending aorta. Aortic dissection can be a life-threatening emergency.

Causes of an Aortic Dissection
Your doctor will discuss your specific cause with you to help you understand your treatment options.

- Connective tissue disorders such as Marfan Syndrome.
- Narrowing or blockage (stenosis) of the aorta.
- Atherosclerosis.
- Pregnancy.
- Trauma.
**Symptoms of an Aortic Dissection**

Signs of an aortic dissection may include:

- Sudden onset of chest or back pain (usually sharp or stabbing).
- Feeling cold and clammy.
- Increased heart rate.
- Abdominal pain.
- Weakness.
- Dizziness.
- Leg pain.

**Aortic Surgery**

The treatment for an aortic aneurysm or an aortic dissection 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 that has 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 durable and heals well in the body.

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

**Aortic Root Replacement**

An aneurysm or dissection of the aortic root is treated by replacing that portion of the aorta with a Dacron® graft. The coronary arteries that arise from the aortic root are re-implanted on the side of the graft (see Figure 4).

**Figure 4. Aortic Root Replacement**
In some cases, your surgeon may be able to repair rather than replace your aortic valve. Valve-sparing root replacement surgery may be done by:

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

In other cases, if the aortic valve cannot be repaired, it is replaced.

**Aortic Arch Replacement**

If the aortic arch is diseased, that portion may need to be replaced by a Dacron® graft (see Figure 5).

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

**Figure 5. Aortic Arch Replacement**

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**Descending Thoracic Aortic and Thoraco-abdominal Aortic Replacement**

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 thoraco-abdominal aortic aneurysm. A longer Dacron® graft is needed to replace an aneurysm of this type.

Replacing the aorta in this area carries a risk of spinal cord injury and respiratory problems. For surgery of the descending aorta or thoraco-abdominal aorta, a drain will be placed in your back to remove spinal fluid to protect the spinal cord. The incision will be in your left chest. The muscles between the ribs are then separated (thoracotomy) to access the aorta. An incision also may be made in the groin if the heart-lung machine is used. After the aorta is repaired, the chest is closed and your incision(s) will be closed with dissolving sutures.
**Thoracic Endovascular Aortic Repair**

Endovascular (inside the blood vessel) surgery is a procedure that requires only small incisions in the groin. The doctor uses special instruments and X-ray to guide the repair through the femoral artery 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 where it is then expanded to fit snugly in place. After the stent graft is in place, the surgeon closes the incisions with sutures that dissolve as you heal.

**Aortic Surgery Risks**

Every surgery carries some risks. The amount depends on such factors as your age and overall health. Risks include bleeding, infection, and lung or heart problems. In rare instances, stroke or spinal cord injury may occur. Your surgeon will discuss your individual risks with you in more detail.

**Health Information Resources**

For more information, visit Northwestern Memorial Hospital’s Alberto Culver Health Learning Center. This state-of-the-art health library is located on the 3rd floor of the Galter Pavilion. Health information professionals are available to help you find the information you need and provide you with personalized support at no charge. You may contact the Health Learning Center by calling 312-926-LINK (5465) or by sending an e-mail to hlc@nm.org.

For additional information about Northwestern Medicine, please visit our website at nm.org.