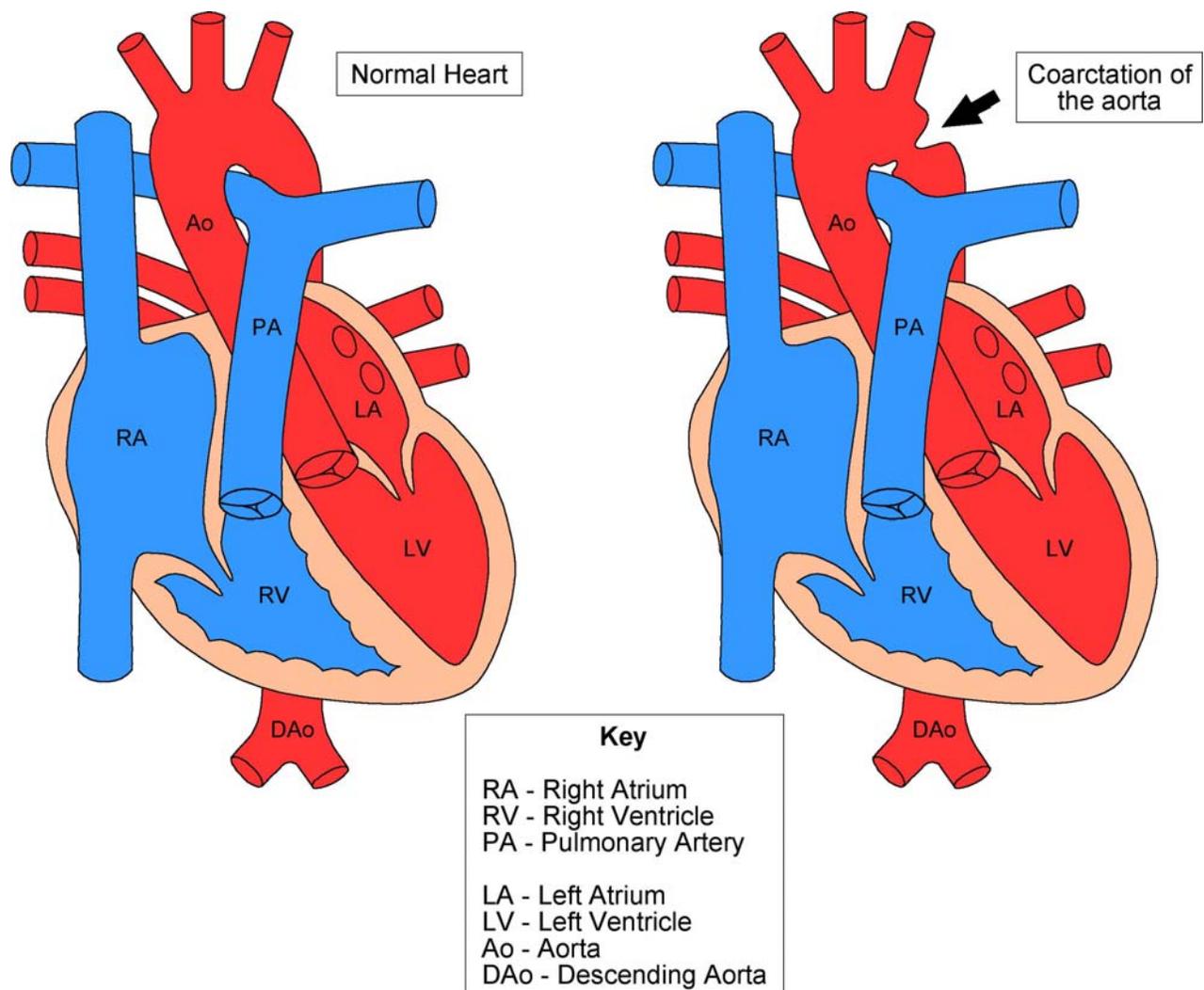


The Adolescent and Adult Congenital Heart Disease Program

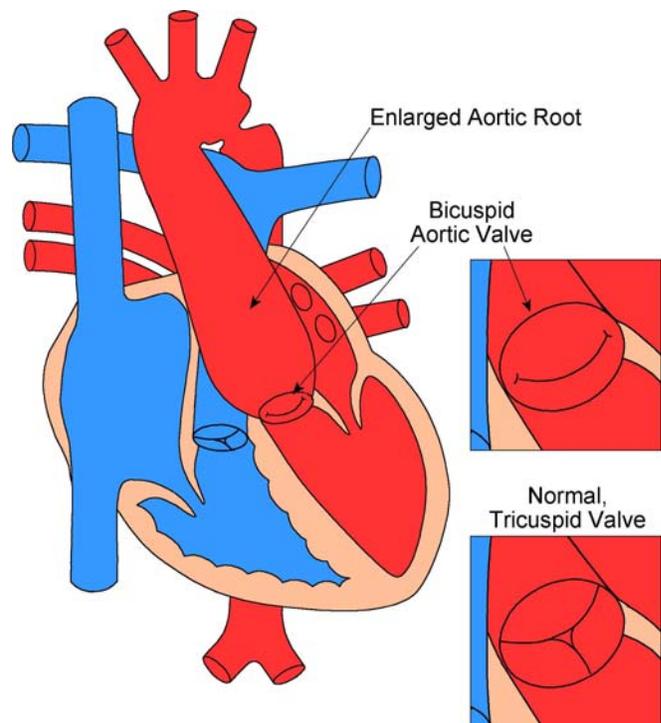
The Heart Center at Nationwide Children's Hospital
& The Ohio State University

Coarctation of the Aorta

The aorta is the major artery that is responsible for supplying the body with oxygenated (red) blood from the heart. The coronary arteries are the first blood vessels to come off of the aorta and supply oxygen to the heart muscle. The aortic arch then gives rise to arteries that supply blood to the head and arms. The descending aorta (lower portion of the aorta) supplies blood to the lower body. Coarctation of the aorta is a congenital heart defect where the aorta is narrowed (obstructed) and usually occurs just past the left subclavian artery (supplies blood to the left upper body) and results in decreased blood flow to the lower body. The left ventricle (pumping chamber) of the heart must work harder in order to pump blood through the narrowed aorta.

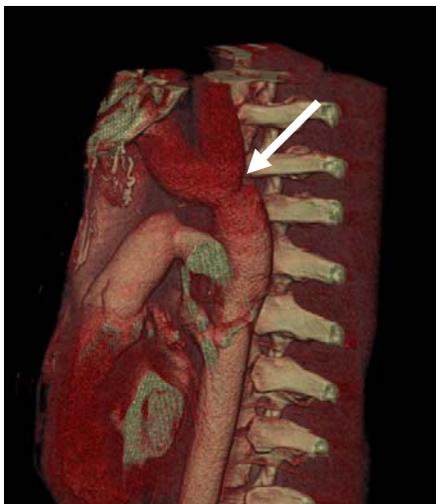


Often times, coarctation of the aorta is diagnosed in infancy. If the narrowing is severe, a baby may develop poor feeding, poor weight gain, fast breathing, pale or grayish skin color, and shock. In some cases, coarctation of the aorta is not discovered until later in life. A mild narrowing may go undetected for years but may be discovered due to high blood pressure in the arms, low blood pressure in the legs, weak pulses in the groin and feet, heart murmur, leg cramping with exercise, and frequent headaches. Coarctation of the aorta may also be associated with genetic abnormalities such as Turner syndrome or with other heart problems such as bicuspid aortic valve. Bicuspid aortic valve occurs when two of the aortic valve leaflets fuse together; fusion of the valve leaflets results in abnormal valve opening and closing, and often leads to leaking of the valve. Bicuspid aortic valve may also be associated with enlargement of aortic root (first section of the aorta).



DIAGNOSTIC STUDIES

Coarctation of the aorta is usually diagnosed by echocardiogram (ultrasound pictures of the heart). Cardiac magnetic resonance imaging), cardiac CT (computerized tomography scan), and cardiac catheterization angiography also show aortic narrowing. A chest x-ray may show heart enlargement or abnormalities of the ribs caused by enlarged blood vessels that are often associated with coarctation of the aorta. An electrocardiogram (EKG) monitors the electrical activity of the heart and may show signs of heart chamber enlargement.



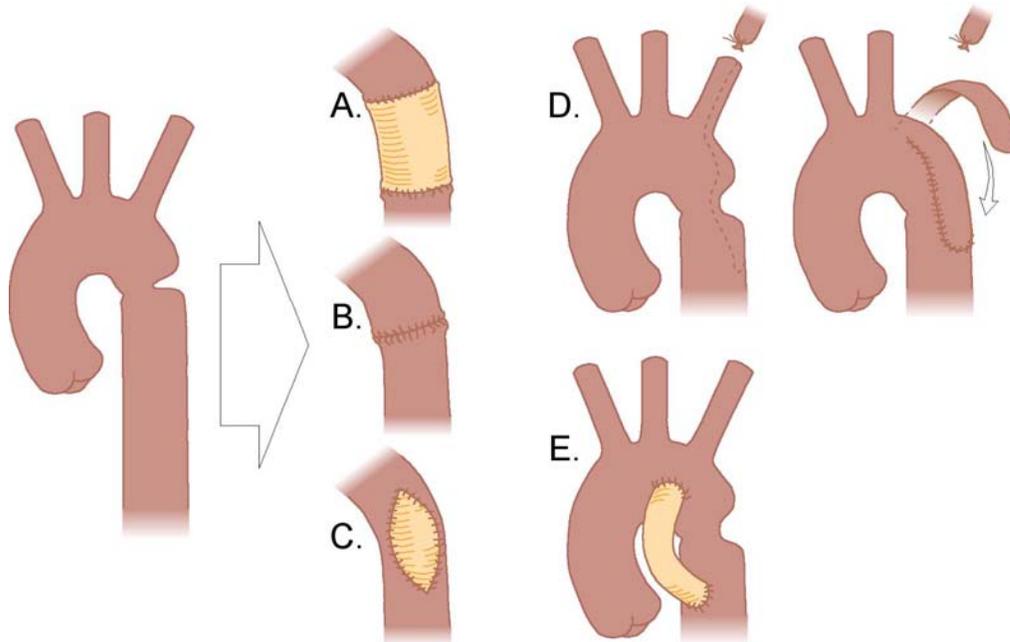
**Figure A-
CT scan of coarctation
of the aorta**



**Figure B-
MRI of coarctation of
the aorta**

TREATMENT

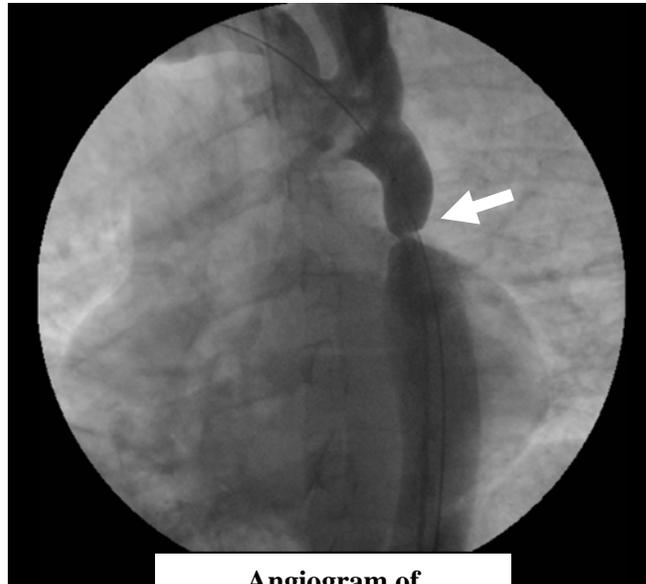
Several treatment options are available to relieve obstruction from coarctation of the aorta. In cases of severe obstruction, surgical intervention is necessary. Surgical techniques to correct coarctation of the aorta include:



- **Interposition graft:** The narrowed portion of the aorta is resected (cut-out) and a graft of synthetic material (in place of aortic tissue) is used to connect the ends (Figure A)
- **End-to-end anastomosis:** The narrowed portion of the aorta is resected and the ends are reconnected (Figure B)
- **Patch augmentation:** The narrowed portion of the aorta is opened and a patch is sewn in to enlarge the aorta (Figure C)
- **Subclavian flap repair:** The left subclavian artery is filleted open, turned down, and sewn into the area of narrowing to enlarge the aorta (Figure D)
- **Ascending to descending aorta bypass graft:** A tube made of synthetic material is sewn into the aorta before and after the narrowing. This tube bypasses the obstruction, enabling blood to flow through the tube to be delivered to the lower body (Figure E)

TRANSCATHETER INTERVENTIONS

In some cases, coarctation of the aorta may be alleviated with procedures that do not require surgery and are performed using transcatheter techniques in the interventional cardiac catheterization laboratory.



**Angiogram of
Coarctation of the aorta**

- **Balloon angioplasty:** A balloon is loaded into a catheter that is inserted into an artery in the groin. The catheter is advanced into the aorta and the balloon is inflated in the narrowing to open up the obstruction. (Figure A)
- **Transcatheter stent therapy:** A stent (mesh-like metal tube) is loaded into a balloon catheter and is inserted into an artery in the groin. The catheter is advanced into the aortic narrowing and the balloon is inflated causing the stent to expand and open the area of narrowing. (Figure B)

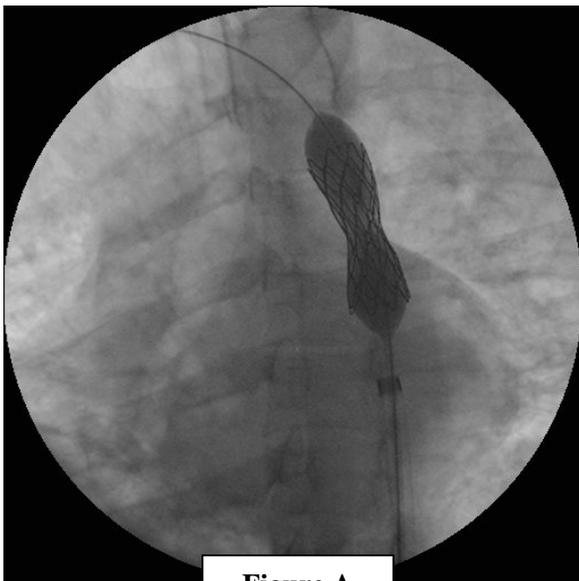


Figure A

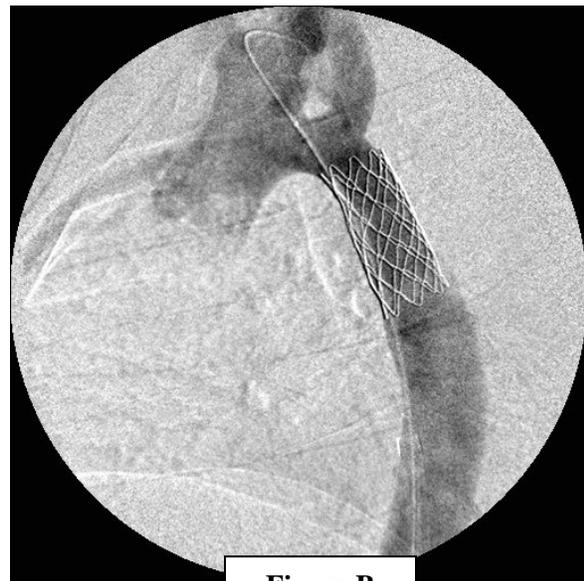


Figure B

LONG TERM COMPLICATIONS from COARCTATION of the AORTA

Despite surgical or interventional catheter based therapies that relieve aortic obstruction, some patients develop long term complications:

- **Left ventricular hypertrophy:** Obstruction forces the left ventricle (left pumping chamber) to work harder to pump blood through this narrowing. Over time, the muscle of the left ventricle may become thick, bulky, and not pump efficiently. This may lead to heart failure and abnormal heart rhythms.
- **Recoarctation of the aorta:** The aortic tissue is abnormal in patients with coarctation of the aorta and may narrow again, even after surgery or intervention.
- **Hypertension (high blood pressure):** Receptors in the aorta are often abnormal in patients with coarctation of the aorta which lead to elevated blood pressures, even after surgery or intervention.
- **Early coronary artery disease:** The coronary arteries supply oxygen to heart tissue. Patients with coarctation of the aorta are at risk for developing narrowing and plaques in the coronary arteries which may cause heart attack or stroke.
- **Aortic aneurysm:** Due to prolonged high blood pressure or previous surgery and stitches, the aorta may become weak and enlarged. Such changes may result in aortic dissection (rupture or tearing of the aorta) and is life-threatening.
(Figures A & B)
- **Berry aneurysm:** Prolonged high blood pressure may also cause arteries in the brain to become weak, enlarged, and rupture. Such a rupture causes bleeding in the brain and is life-threatening.
- **Subacute bacterial endocarditis (SBE):** Turbulent blood flow inside the heart may predispose patients with coarctation of the aorta and/or bicuspid aortic valve to develop an infection in the heart, in the event that bacteria enters the blood stream.

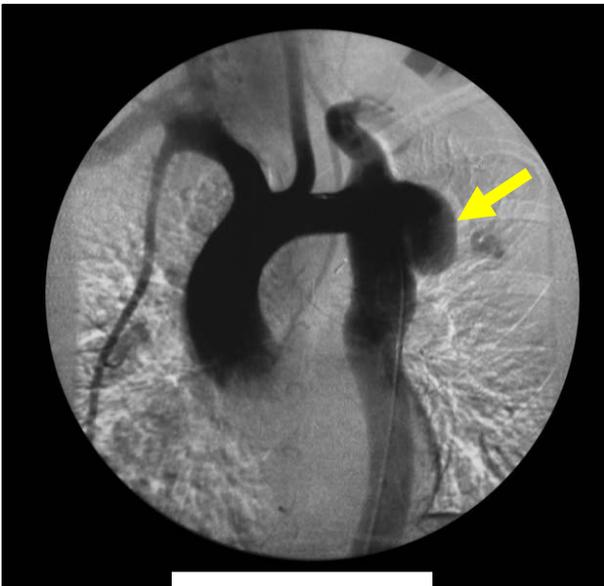


Figure A-
Angiogram of
aortic aneurysm

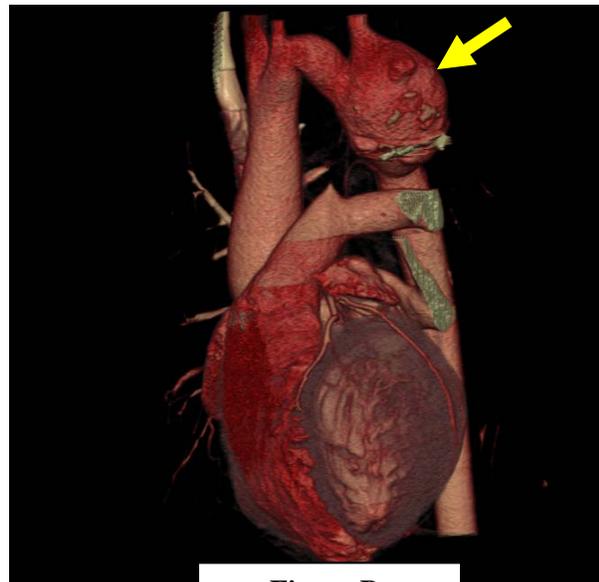


Figure B-
CT scan of
aortic aneurysm

HEALTH PROMOTION and PREVENTION of COMPLICATIONS

Early identification and treatment of long-term complications is essential in keeping you healthy. This may be achieved by:

- **Routine clinic follow-up:** Physical examination may reveal hypertension, recoarctation of the aorta, and heart failure.
- **Cardiac imaging studies:** Echocardiogram, cardiac MRI or cardiac CT may be used to identify recoarctation of the aorta, aortic aneurysm, coronary artery disease, aortic valve problems, and to evaluate the left ventricle.
- **Ambulatory blood pressure monitoring:** A blood pressure monitor worn for a 24 hour period may identify hypertension occurring with daily activities that is not evident during a clinic visit.
- **Exercise stress testing:** Blood pressure measurements obtained during exercise may evaluate for recoarctation of the aorta as well as severity of hypertension during physical activity.
- **Fasting lipid profile:** A baseline blood-draw is important in identifying high cholesterol which may lead to plaques in the coronary arteries. If normal, cholesterol should be checked yearly thereafter. If elevated, cholesterol may be lowered with lipid-lowering medications, healthy diet, and exercise.
- **Holter monitor:** A Holter monitor records each heart beat in a 24 hour period to evaluate for abnormal heart rhythms.
- **Be aware of cardiac symptoms:** Seek medical attention for development of frequent headaches, nosebleeds, elevated blood pressure, visual disturbances, aching of the calves with exercise, chest or back pain, racing or skipping heart beats, or persistent unexplained fevers.

KEEP YOURSELF HEALTHY:

- Avoid all tobacco products
- Take medications as they are prescribed (including antibiotics for dental procedures, tattoos, & piercings if indicated for your heart defect)
- Maintain good blood pressure control
- Weight control
- Control of blood fats (cholesterol, triglycerides)
- Eat a healthy diet (low-sodium, low-fat)
- Regular aerobic exercise (walking, swimming, jogging, or biking) for at least 30 minutes most days of the week
- Avoid isometric exercises (heavy weight lifting, chin ups, push ups), grunting or straining activities that cause added strain to the heart
- Avoid dietary or medication sources of stimulants (caffeine in soda or chocolate, ephedrine/pseudoephedrine-containing decongestant cold medications)
- If you are female, it is important to plan pregnancy with your cardiologist to ensure optimal cardiac status, prior to becoming pregnant