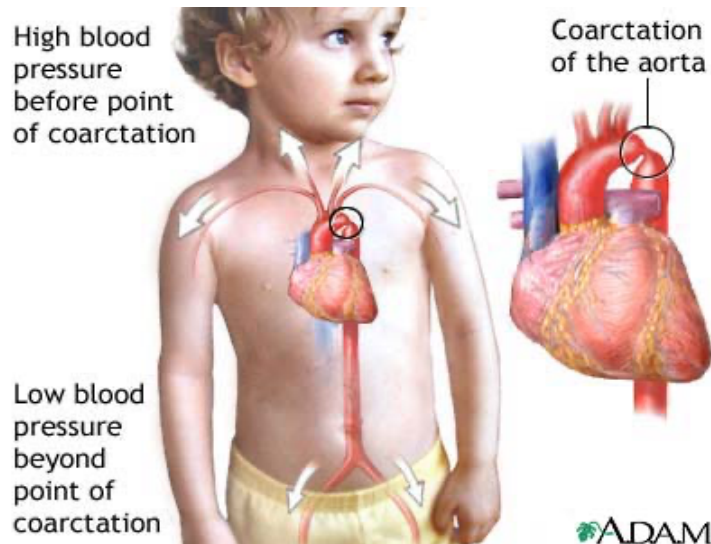


Pediatric Cardiovascular Pathology

Dr. Gary Mumaugh – Campbellsville University

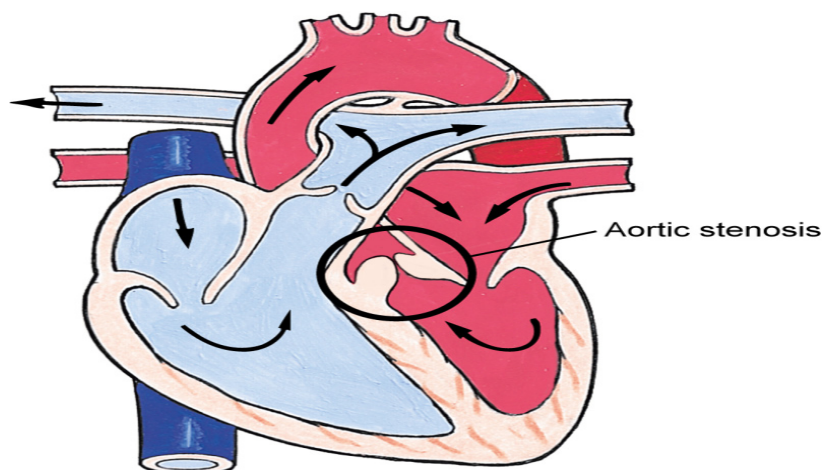
Congenital Heart Defects

- Major cause of death in the first year of life other than prematurity
- Prenatal, environmental, and genetic risk factors:
 - Maternal rubella or increased age, type 1 diabetes, alcoholism, PKU, drugs, and hypercalcemia
 - Prematurity
 - Chromosome aberrations
- Heart defects
- Hemodynamic alterations
 - Right-to-left shunt, left-to-right shunt
- Status of tissue oxygenation
 - Cyanotic defects
 - Acyanotic defects



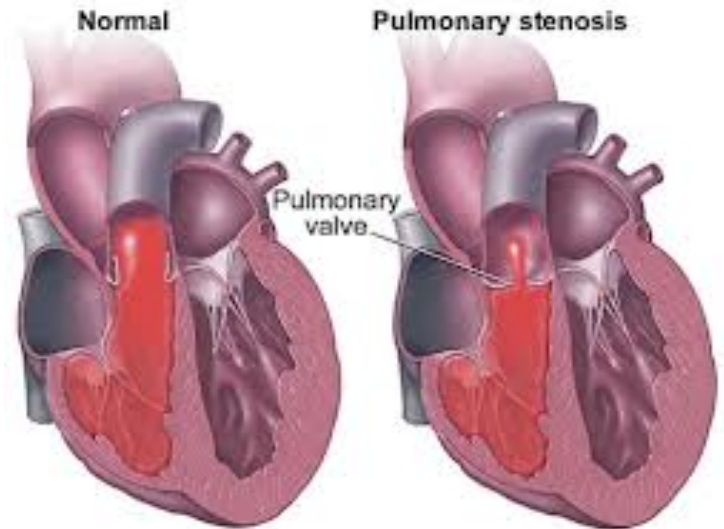
Obstructive Defects

- Coarctation of the aorta
 - Narrowing of the lumen of the aorta that impedes blood flow
 - Almost always in a juxtaductal position
 - Manifestations:
 - If severe decreased CO, acidosis, hypotension at birth
 - If mild, no manifestations until find hypertension in upper extremities at older age
- Aortic stenosis
 - Narrowing of the aortic outflow tract
 - Caused by malformation or fusion of the cusps
 - Causes increased workload on left ventricle and left ventricular hypertrophy
 - Various types
 - Manifestations:
 - Infant: if significant faint pulses, hypotension, tachycardia, and poor feeding
 - Older children: may have complaints of exercise intolerance
 - Risk for bacterial endocarditis



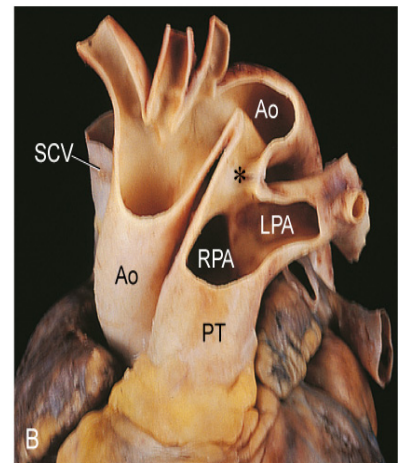
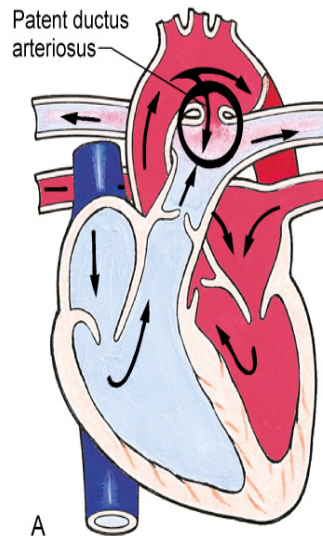
Obstructive Defects - continued

- Valvular aortic stenosis
 - Malformed or fused cusps
 - Progressive obstruction with episodes of ischemia
 - Strenuous activity limited
- Subvalvular aortic stenosis
 - Stricture caused by a fibrous ring below a valve
- Pulmonic stenosis
 - Narrowing of the pulmonary outflow tract
 - Abnormal thickening of the valve leaflets
 - Narrowing of the valve with resistance to flow from right ventricle to pulmonary artery
 - Right ventricular hypertrophy
 - Pulmonary semilunar valve atresia
 - Manifestations:
 - If severe: cyanosis from right-to-left shunt through atrial septal defect; decreased CO



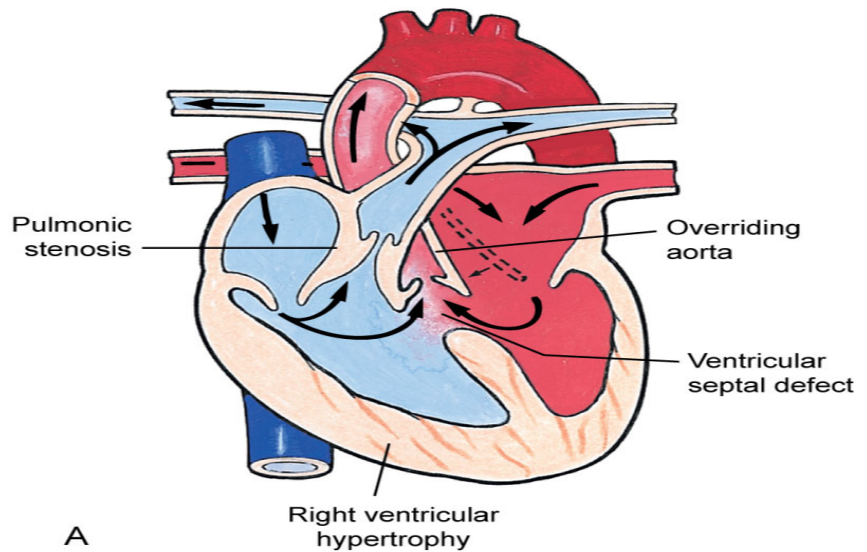
Defects Increasing Pulmonary Blood Flow

- Patent ductus arteriosus (PDA)
 - Failure of the ductus arteriosus to close
 - PDA allows blood to shunt from the aorta to pulmonary artery causing left-to-right shunt
 - Manifestations:
 - Asymptomatic or pulmonary overcirculation (dyspnea fatigue, poor feeding)
 - Complications:
 - Risk for bacterial endocarditis
- Atrial septal defect
 - Abnormal opening between the atria; blood flows from left atria to right atria
 - Manifestations:
 - Asymptomatic at early age
 - Pulmonary symptoms on exertion at later age

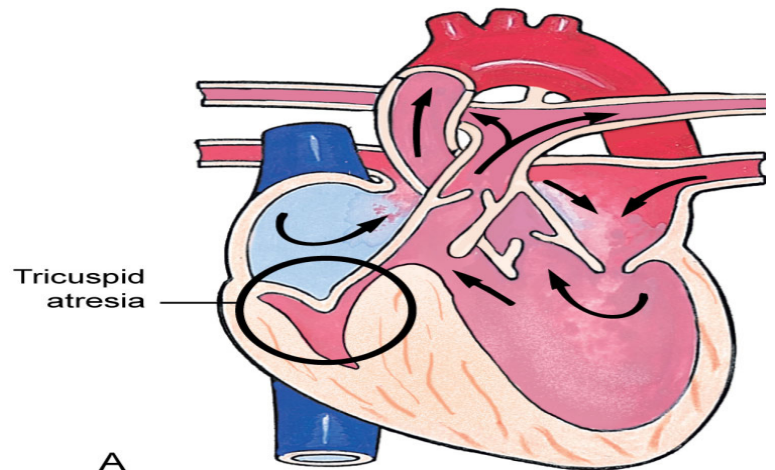


Defects Increasing Pulmonary Blood Flow - continued

- Ventricular septal defect (VSD)
 - Abnormal communication between the ventricles
 - Most common type of congenital heart lesion
 - Two types
 - Manifestations:
 - May be asymptomatic
 - If severe: increased pulmonary blood flow from left-to-right shunt; pulmonary hypertension
- Tetralogy of Fallot
 - Syndrome represented by four defects:
 - Ventricular septal defect (VSD)
 - Overriding aorta
 - Pulmonic valve stenosis
 - Right ventricle hypertrophy
 - Manifestations:
 - Acute cyanosis at birth or gradual cyanosis
 - Gradual clubbing, poor growth; Tet spells
 - If untreated, emboli, stroke, brain abscess, seizures

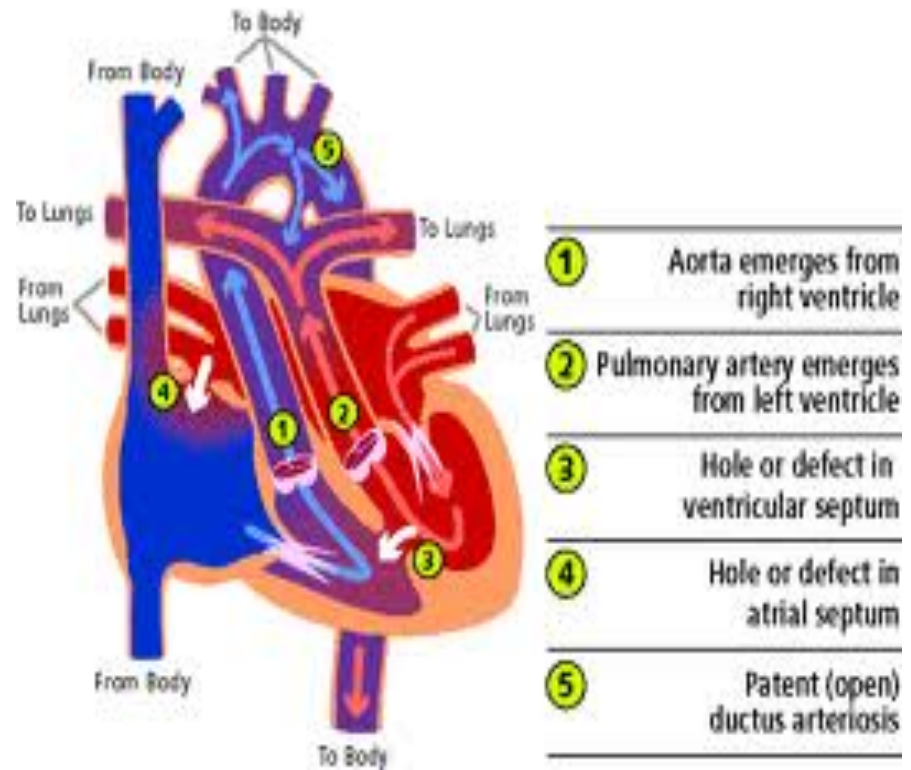


- Tricuspid atresia
 - Imperforate tricuspid valve
 - Lack of communication between the right atrium and right ventricle
 - Additional defects:
 - Atrial septal defect
 - Hypoplastic or absent right ventricle
 - Enlarged mitral valve and left ventricle
 - Pulmonic stenosis
 - Manifestations:
 - In newborn, cyanosis, tachycardia, dyspnea, poor feeding
 - In older child, signs of chronic hypoxemia



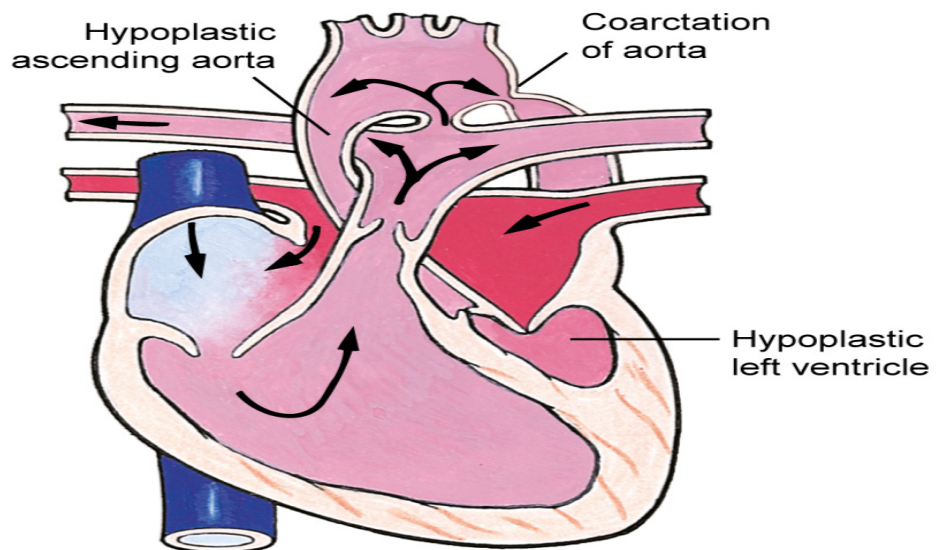
Mixed Defects

- Transposition of the great arteries
 - Aorta arises from the right ventricle and the pulmonary artery arises from the left ventricle
 - Results in two separate, parallel circuits
 - Unoxygenated blood circulates continuously through the systemic circulation
 - Oxygenated blood circulates continuously through the pulmonary circulation
 - Extruterine survival requires communication between the two circuit
 - Manifestation: Depends on size and associated defects
- Truncus arteriosus
 - Failure of the embryonic artery and the truncus arteriosus to divide into the pulmonary artery and the aorta
 - The trunk straddles an always present VSD



Obstructive Defects

- Hypoplastic left heart syndrome
 - Abnormal development of the left-sided cardiac structures
 - Obstruction to blood flow from the left ventricular outflow tract
 - Underdevelopment of the left ventricle, aorta and aortic arch; mitral atresia or stenosis; coarctation of the aorta
 - Manifestations occur early in newborn (cyanosis, tachypnea, decreased CO)
 - Fatal in early life if untreated



Heart Failure

- Heart is not able to maintain cardiac output at level that meets demands of body
- Result from poor ventricular function
- Complication of many congenital heart defects

Acquired Cardiovascular Disorders

- Systemic hypertension
 - In children defined as systolic and diastolic pressure that is over the 95th percentile for age and gender on at least three occasions
 - Hypertension in children differs from adults:
 - Often has an underlying disease
 - Renal disease or coarctation of aorta
 - A cause of the hypertension in children is almost always found
 - Children commonly asymptomatic
 - Seeing increased incidence of primary hypertension in older children related to obesity

Acquired Cardiovascular Disorders

- Childhood obesity
 - Multivariable and multidimensional
 - Risks:
 - Insulin resistance, diabetes, cardiovascular disease
 - Childhood nutrition, level of physical activity, and engagement of sedentary activities (TV, computer use, etc.)
 - Association with parental obesity
 - Epidemic in the USA