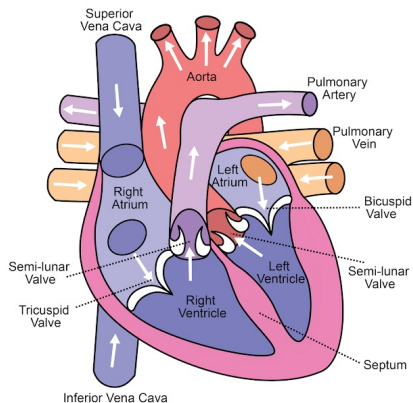


### The Human Heart



### Risk Factors

- Cardiac development occurs very early in fetal life
- maternal factors (rubella, alcohol, diabetes mellitus)
- Genetic factors (history of congenital heart disease)
- Trisomy 21 (Down syndrome)
- Presence of other congenital anomalies or syndrome.

### Atrial septal defect (Acyanotic)

Opening in the atrial septum permitting free communication of blood between the 2 atria

**Ostium primum (ASD1)** open at lower end of septum

**Ostium secundum (ASD2)** open near the center septum

### Pathophysiology

### Atrial septal defect (Acyanotic) (cont)

- Blood flows from left to right (oxy to deoxy) because of the stronger contraction of the left side of the heart, causing an increase volume in the right.
- Right atrium enlarged, ventricular hypertrophy and increased pulmonary artery blood flow.

### Signs and symptoms

- Dyspnea on exertion, fatigability, mild growth failure
- Cyanosis does not occur unless CHF is present.

### Diagnosis

- ECG with color flow doppler reveal enlarged right side of the heart
- Cardiac catheterization reveal separation in atrial septum

### Treatments

- Surgical or catheterization laboratory for ASD2
- Surgery : sutured, completed with catheterization
- Cardiopulmonary bypass : open heart surgery
- Silastic or Dacron patch : sutured in place

### Complications

- Infectious endocarditis and eventual heart failure
- can cause emboli during pregnancy if not treated

### Aortic Stenosis (Acyanotic)

Narrowing at above or below the aortic valve.

**Supravalvular** ascending aorta. least common

**Valvular** most common

**Subvalvular** subaortic. left outflow tract.

### Signs & Symptoms

- Mild: exercise intolerance, easy fatigability, asymp.
- Moderate: Chest pain, dyspnea, dizziness & syncope
- Severe: weak pulses, left failure, hypotension, tachy and activity intolerance chest pain and sudden death.

### Treatment

- Balloon valvuloplasty as the standard treatment
- Mild: activity should not be restricted
- Mod-severe: no competitive sports
- Cardiac catheterization: Balloon dilation
- Surgical valvotomy: if closed procedure doesn't work. done to older pts. when severe calcium deposits further obstruct the valve.
- Beta blocker or calcium channel blocker
- Antibiotic prophylaxis against endocarditis

C

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### Acyanotic (Congenital heart defect)

#### Increased pulmonary blood flow

- Atrial septal defect
- Ventricular septal defect
- Patent ductus arteriosus
- Atrioventricular canal

#### Obstruction to blood flow from ventricles

- Coarction of the aorta
- Aortic stenosis
- Pulmonic stenosis

### Diagnostic Tests

Echocardiogram	Cardiac Catheterization
Electrocardiogram	Chest X-ray
Echocardiography	MRI

### Ventricular Septal Defect (Acyanotic)

Abnormal opening in ventricular septum, allows free communication between R & L ventricles

**Small to moderate VSD:** 3-6 mm, asymptomatic

**Moderate to large VSD:** symptomatic, require repair

**Signs & Symptoms** 4-8 weeks

- Easy fatigue, failure to thrive, dyspnea
- A loud, harsh murmur on left sternal border (3rd/4th)
- Thrill may be palpable, respiratory infections

#### Treatment

- Small VSD: no surgical intervention, just reassurance

### Ventricular Septal Defect (Acyanotic) (cont)

• Symptomatic VSD: meds, afterload reducers, diuretics

• Moderate: cardiac catheterization

• Larger: 3mm open heart surgery

• Exceptionally large: Silastic or Dacron patch

#### Complications

- Cardiac or Heart failure
- Endocarditis due to recirculating blood flow

**Indication for surgery:** Large vsd with uncontrolled symptomatology, Ages 6-12 mo. with large vsd & pulmonary HTN

### Pulmonary Stenosis (Acyanotic)

Narrowing of the pulmonary valve or PA that results in the obstruction of blood flow from the ventricles.

#### Signs & Symptoms

- Mild : Asymptomatic, split 2nd heart sound w/ delay
- Heart failure (right) & cyanosis with severe
- Systolic ejection murmur, Right ventricular enlargement
- Exercise intolerance

#### Treatment

- Mild: No intervention needed, close follow up
- Mid-severe: requires relieve of stenosis
- Balloon valvuloplasty, treatment of choice
- Surgical valvotomy is also a consideration.
- Open-heart needed only for more complex valve anomaly.

### Cyanotic (Congenital heart defect)

#### Decreased pulmonary blood flow

- Tetralogy of Fallot
- Tricuspid atresia

#### Mixed blood flow

- Transposition of great vessels
- Truncus arteriosus
- Total anomalous pulmonary venous return
- Hypoplastic left heart syndrome

### Atrioventricular Septal Defects (Acyanotic)

• Also called an **endocardial cushion defect**, results from incomplete fusion of the endocardial cushion. At the septum of the heart

• Consists of a low atrial septal defect continuous with ventricular septal defect & clefts of mitral & tricuspid, creating a large central AV valve

- Allows blood to flow between all heart chambers.

#### Signs and Symptoms

- CHF in infancy, Failure to thrive, recurrent infections
- Exercise intolerance, easy fatigability
- Cardiac enlargement on CX-ray

• Late cyanosis from pulmonary vascular w/ R to L shunt

#### Treatment

- Surgery is always required
- Treatment of congestive symptoms.
- Pulmonary banding maybe req. in premature or <5kg



### Patent Ductus Arteriosus (Acyanotic)

Conduit between pulmonary artery & aorta fails to close and results in increased pul. blood flow (L to R shunt)

**Ductus Arteriosus** fetal structure that connects PA to the aorta. Closure at first breath and is incomplete bet. 7 to 14 days. closure not until 3 mos.

- blood will shunt from aorta (oxy) to the PA (deoxy) because of the increased pressure in the aorta.

#### Signs & Symptoms

- Small PDA: usually asymptomatic
- Large PDA: symptoms of CHF & growth restriction
- Bounding arterial pulses, Widened pulse pressure
- Enlarged heart, prominent apical impulse.
- Classic continuous machinery systolic murmur
- Mild-diastolic murmur at the apex.

#### Treatment

- Indomethacin, inhibitor of prostaglandin synthesis
- Surgical or catheter closure.

Same complications

### Coarction of the Aorta (Acyanotic)

Narrowing of aorta due to a constricting band

#### Signs & Symptoms

- Diminution or absence of femoral pulses
- Higher BP in upper extremities, headache, vertigo
- Weak lower extremity pulses. decrease cardiac output
- Epistaxis & CVA not in children due to elevated BP
- Leg pain due to diminished blood supply

#### Treatments

- Surgical intervention, prevent left vent dysfunction
- Angioplasty is used by some centers
- Balloon angioplasty is the procedure of choice
- Antihypertensive - High BP post-op
- Antibiotic as prophylactic



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