Valvular disorders
Valvular Disorders

- Stenosis - stiffening
- Prolapse - slipping out of place
- Regurgitation - leaking
- Atresia - malformation
Stenosis

- Tricuspid - Atrial enlargement, Ventricular shrinking
- Pulmonic - Ventricular enlargement, poor oxygen delivery
- Mitral - Atrial enlargement, Systemic symptoms
- Aortic - Ventricular enlargement, poor systemic circulation
Prolap s e

- **Mitral Valve Prolapse- Barlow Syndrome/ Leaky valve Syndrome**
  - Structural issue
  - “Stretchy” valve tissue
- **Tricuspid, Aortic, or Pulmonic Valve Prolapse**
  - Much less common
  - Similar etiology
Regurgitation

- Tricuspid - atrial enlargement
- Pulmonic - Respiratory symptoms
- Mitral - Systemic and pulmonic symptoms
- Aortic - Ventricular hypertrophy
Atresia

Congenital disorder- valve not properly developed

More often affects the right side of the heart

Tricuspid Valve
Pulmonic Valve

Symptoms depend on type location of atresia
Causes

- Congenital Heart Disease
  - Bicuspid Aortic Valve
- Marfan Syndrome
- Age
- Rheumatic Fever
- Radiation Therapy
- Pre-existing cardiac conditions
Diagnosis

- Heart murmur video: https://www.youtube.com/watch?v=Q5-0mSydRR4
- ECG
- Echocardiography
- CT/ MRI

Figure 1: Phonograms from normal & abnormal heart sounds
Signs and Symptoms

Heart Valve Disease
Signs and Symptoms

Fluttering chest sensation

Chest pain (angina)

Short of breath

Fatigue or weakness

Tired

Rapid weight gain

Lightheadedness or loss of consciousness

Coughing

Swollen ankles

Abdominal bloating
Treatment

Medications
- Diuretics
- Anti-Arrhythmics
- Anticoagulants

Valve Repair

Valve Replacement
Valve Repair

- Done for the AV Valves, rather than the semilunar valves
- Surgical options
  - Commissurotomy/valvulotomy
  - Annuloplasty-ring of braided polyester
- Percutaneous/Transcatheter options
  - Balloon Valvuloplasty
  - Mitral Valve Clip
Valve Replacement

- Mechanical
  - Pros: long lasting, very durable
  - Cons: increased risk for blood clots, endocarditis
Tissue Valve replacements

- **Xenograph: porcine, bovine, human donor**
  - +++ studies done re- bovine vs porcine
  - Human grafts very rare
- **Pros** - similar to intrinsic anatomy
- **Cons** - require replacement more often than mechanical valves
TAVI

- Trans Aortic Valve replacement
- Percutaneous aortic valve replacement
- For those who are not able to tolerate open heart surgery
  - Older
  - Hemodynamically unstable
- Newer procedure, still being perfected
  - Complications have to do with insertion/migration
Infective Endocarditis

- Formerly known as bacterial endocarditis
- Infection/inflammation of the lining of the heart with formation of masses
  - Affects the valves most often
- Those who have had rheumatic fever and valve replacements more susceptible
  - Migration of oral bacteria
  - Intravenous drug use
Signs and Symptoms

- Fever & Chills
- New heart murmur
- Osler and Janeway Nodes
- Sudden weight loss and flu-like symptoms
Diagnosing Endocarditis

- Echo
- CT/ MRI
- Blood Cultures
Treating Endocarditis

- Antibiotics/Antifungals
- Mass Removal
- Valve Replacement
Cardiomyopathy

- Different types
  - Dilated Cardiomyopathy
  - Hypertrophic Cardiomyopathy
  - Restrictive Cardiomyopathy
- Various causes
- Serious and often end stage
- Athletic Heart Syndrome
Congenital Heart Conditions
Fetal Circulation

1. Umbilical Vein:
   A blood vessel carrying oxygen-rich blood returning from the placenta

2. Foramen Ovale:
   A helpful hole connecting the right and left side of the heart!
   Provides a shortcut for blood to bypass the tight blood vessels in the lungs

3. Pulmonary Vasoconstriction:
   Tight blood vessels in the lungs restrict the amount of blood that can flow through them

4. Ductus Arteriosus:
   Another shortcut allowing blood to bypass the tight blood vessels in the lungs, exit the heart, and make its way to the rest of the body
CHD

- Often diagnosed prenatally or shortly after birth
  - Poor feeding, lethargic
- Most common type of congenital disorder
  - Heart develops early on in utero
- Range from mild to severe
- Affects on multiple organ systems
  - GI, renal, neuro/ developmental

https://globalnews.ca/video/rd/205477443793/?jwsource=c1
Categories of CHD

- Septal Defects
- Cyanotic Defects
- Obstructive Defects
- “Other” Defects - many different types!
Septal Defects

- **Atrial Septal Defects**
  - Foramen Ovale Closure delay
  - Treatment depends on size of opening

- **Ventricular Septal Defects**
  - Different types depending on which tissue is involved
  - Require open heart surgery to treat

![Diagram of atrial and ventricular septal defects](image.png)
Cyanotic Defects

“Blue Baby” conditions

Lack of blood flow to the body, the lungs, or both!
Ebstein’s Anomaly

- “Atrialization” of the Right Ventricle
- ASD often present as well
- Association with arrhythmias
- Surgical repair of valve if possible
- Transplant may be necessary
Transposition of the Great Arteries
Surgical options

- Keep foramen ovale open (PGE’s)
  - Atrial septostomy
- Arterial Switch
Tetralogy of Fallot

**Normal Heart**

- Pulmonary Veins from Lungs
- Superior Vena Cava
- Atrial Septum
- Tricuspid Valve
- Inferior Vena Cava
- Pulmonary Valve

**Oxygen-rich Blood**
- PA = Pulmonary Artery
- LA = Left Atrium
- LV = Left Ventricle
- RV = Right Ventricle

**Oxygen-poor Blood**

**Tetralogy of Fallot (TOF or "Tet")**

- Mitral Valve
- Aorta Shifted to Right
- Opening Between Ventricles
- Pulmonary Valve
- Right Ventricular Outflow Obstruction
- Mixed Blood
- RV = Right Ventricle
Single Ventricle Disorders
Tricuspid Atresia

**Normal Heart**
- Pulmonary Veins from Lungs
- Superior Vena Cava
- Atrial Septum
- Tricuspid Valve
- Ventricular Septum
- Pulmonary Valve

**Tricuspid Atresia**
- Opening Between Atria
- Closed Tricuspid Valve
- Underdeveloped Right Ventricle

Legend:
- AO = Aorta
- PA = Pulmonary Artery
- LA = Left Atrium
- RA = Right Atrium
- LV = Left Ventricle
- RV = Right Ventricle

Blood Flows:
- Oxygen-rich Blood
- Oxygen-poor Blood
Surgical repair of TA

- Blalock Taussig Shunt
- First stage of surgery
- Replaced at 3-6 months of age
Stage 2: Bidirectional Glenn
Stage 3: Fontan

Lateral tunnel Fontan

Superior vena cava attached to right pulmonary artery

Inferior vena cava connected to superior vena cava by a baffle (tunnel) inside the right atrium

© The Royal Children's Hospital, Melbourne, Australia
The Norwood Procedure
Bidirectional Glenn (Stage II)
The Fontan
Prognosis

- Life expectancy 35-40 years
- Systemic venous hypertension - liver and kidney issues
- Outcomes for those undergoing transplant later on are poor
- Modernization of medicine has presented benefits and challenges
Dextrocardia

- Heart’s position is reversed in the chest
- May be a part of situs inversus or can occur independently
- May cause complications in other organs
Next week - Lasts class!