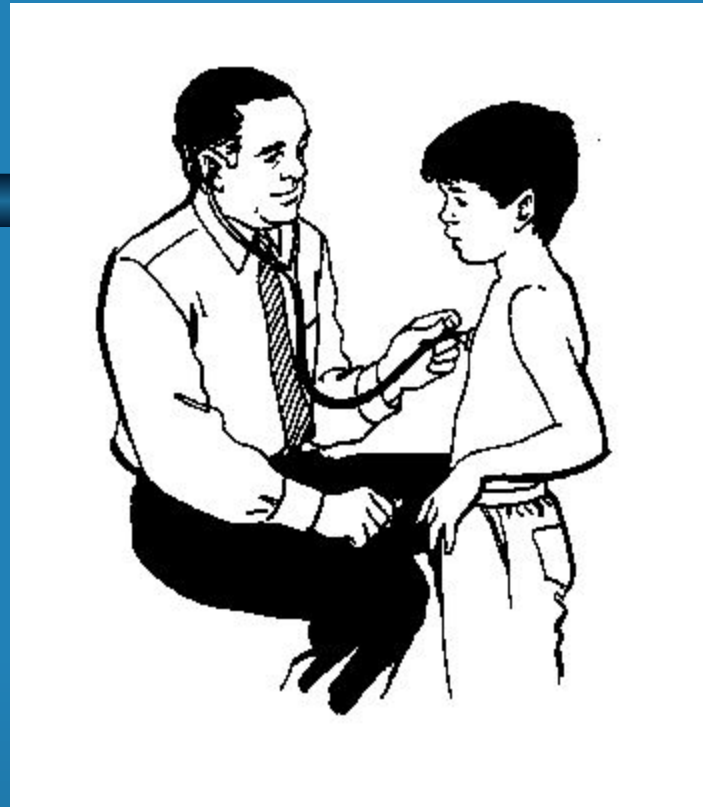


# Heart Murmurs



David Leder

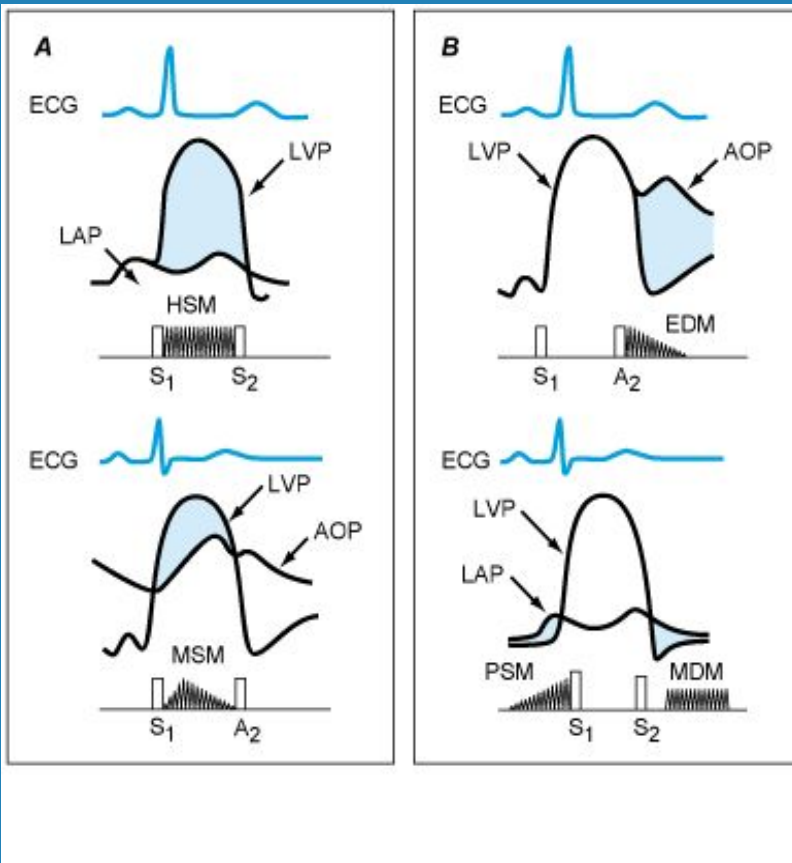


# Outline

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- I. Basic Pathophysiology
- II. Describing murmurs
- III. Systolic murmurs
- IV. Diastolic murmurs
- V. Continuous murmurs
- VI. Summary

# Basic Pathophysiology



Murmurs = Math

$$Q = V * A$$

$$Q = P/R$$

$$N_R = d * D * V/n$$

Therefore:

Inc. P => Inc. V => Inc. N<sub>R</sub>

**Systolic      Diastolic**



# Describing a heart murmur

## 1. Timing

- murmurs are longer than heart sounds
- HS can distinguished by simultaneous palpation of the carotid arterial pulse
- systolic, diastolic, continuous

## 2. Shape

- crescendo (grows louder), decrescendo, crescendo-decrescendo, plateau

## 3. Location of maximum intensity

- is determined by the site where the murmur originates
- e.g. A, P, T, M listening areas

# Describing a heart murmur con't:

## 4. Radiation

- reflects the intensity of the murmur and the direction of blood flow

## 5. Intensity

- graded on a 6 point scale
  - Grade 1 = very faint
  - Grade 2 = quiet but heard immediately
  - Grade 3 = moderately loud
  - Grade 4 = loud
  - Grade 5 = heard with stethoscope partly off the chest
  - Grade 6 = no stethoscope needed

\*Note: Thrills are assoc. with murmurs of grades 4 - 6



# Describing a heart murmur con't:

## 6. Pitch

- high, medium, low

## 7. Quality

- blowing, harsh, rumbling, and musical

## 8. Others:

### i. Variation with respiration

- Right sided murmurs change more than left sided

### ii. Variation with position of the patient

### iii. Variation with special maneuvers

- Valsalva/Standing => Murmurs decrease in length and intensity

**EXCEPT:** Hypertrophic cardiomyopathy and Mitral valve prolapse



# Systolic Murmurs

- Derived from increased turbulence associated with:
  1. Increased flow across normal SL valve or into a dilated great vessel
  2. Flow across an abnormal SL valve or narrowed ventricular outflow tract - e.g. aortic stenosis
  3. Flow across an incompetent AV valve - e.g. mitral regurg.
  4. Flow across the interventricular septum



# Early Systolic murmurs

1. Acute severe mitral regurgitation
  - decrescendo murmur
  - best heard at apical impulse
  - Caused by:
    - i. Papillary muscle rupture
    - ii. Infective endocarditis
    - iii. Rupture of the chordae tendineae
    - iv. Blunt chest wall trauma
2. Congenital, small muscular septal defect
3. Tricuspid regurg. with normal PA pressures





# Midsystolic (ejection) murmurs

- Are the most common kind of heart murmur
- Are usually crescendo-decrescendo
- They may be:
  1. Innocent
    - common in children and young adults
  2. Physiologic
    - can be detected in hyperdynamic states
    - e.g. anemia, pregnancy, fever, and hyperthyroidism
  3. Pathologic
    - are secondary to structural CV abnormalities
    - e.g. Aortic stenosis, Hypertrophic cardiomyopathy, Pulmonic stenosis

# Aortic stenosis

- Loudest in aortic area; radiates along the carotid arteries
- Intensity varies directly with CO
- A2 decreases as the stenosis worsens
- Other conditions which may mimic the murmur of aortic stenosis w/o obstructing flow:
  1. Aortic sclerosis
  2. Bicuspid aortic valve
  3. Dilated aorta
  4. Increased flow across the valve during systole



# Hypertrophic cardiomyopathy

- Loudest b/t left sternal edge and apex; Grade 2-3/6
- Does NOT radiate into neck; carotid upstrokes are brisk and may be bifid
- Intensity increases w/ maneuvers that decrease LV volume

# Pansystolic (Holosystolic) Murmurs

- Are pathologic
- Murmur begins immediately with S1 and continues up to S2

## 1. Mitral valve regurgitation

- Loudest at the left ventricular apex
- Radiation reflects the direction of the regurgitant jet
  - i. To the base of the heart = anterosuperior jet (flail posterior leaflet)
  - ii. To the axilla and back = posterior jet (flail anterior leaflet)
- Also usually associated with a **systolic thrill**, a **soft S3**, and a short **diastolic rumbling** (best heard in left lateral decubitus)

## 2. Tricuspid valve regurgitation

## 3. Ventricular septal defect

# Diastolic Murmurs

- Almost always indicate heart disease
- **Two basic types:**
  1. Early decrescendo diastolic murmurs
    - signify regurgitant flow through an incompetent semilunar valve
      - e.g. aortic regurgitation
  2. Rumbling diastolic murmurs in mid- or late diastole
    - suggest stenosis of an AV valve
      - e.g. mitral stenosis

# Aortic Regurgitation

- Best heard in the 2nd ICS at the left sternal edge
- High pitched, decrescendo
- Blowing quality => may be mistaken for breath sounds
- Radiation:
  - i. Left sternal border = assoc. with primary valvular pathology;
  - ii. Right sternal edge = assoc. w/ primary aortic root pathology
- Other associated murmurs:
  - i. Midsystolic murmur
  - ii. Austin Flint murmur



# Mitral Stenosis

- Two components:
  1. Middiastolic - during rapid ventricular filling
  2. Presystolic - during atrial contraction; therefore, it disappears if atrial fibrillation develops
- Is low-pitched and best heard over the apex (w/ the bell)
- Little or no radiation
- Murmur begins after an Opening Snap; S1 is accentuated



# Continuous Murmurs

- Begin in systole, peak near s2, and continue into all or part of diastole.
  1. Cervical venous hum
    - Audible in kids; can be abolished by compression over the IJV
  2. Mammary souffle
    - Represents augmented arterial flow through engorged breasts
    - Becomes audible during late 3rd trimester and lactation
  3. Patent Ductus Arteriosus
    - Has a harsh, machinery-like quality
  4. Pericardial friction rub
    - Has scratchy, scraping quality





# Back to the Basics

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1. When does it occur - systole or diastole
2. Where is it loudest - A, P, T, M

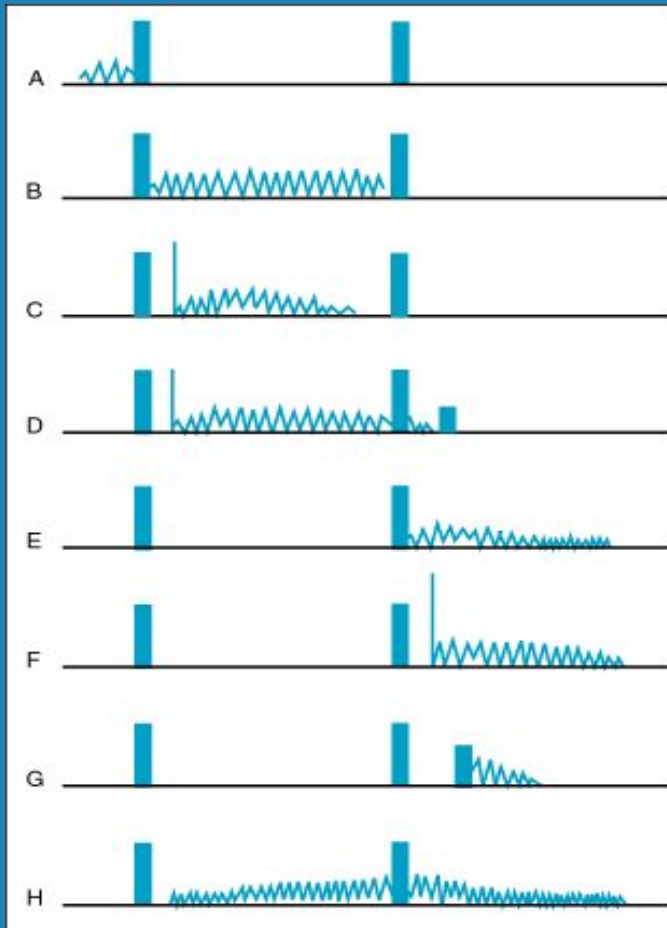
## I. Systolic Murmurs:

1. Aortic stenosis - ejection type
2. Mitral regurgitation - holosystolic
3. Mitral valve prolapse - late systole

## II. Diastolic Murmurs:

1. Aortic regurgitation - early diastole
2. Mitral stenosis - mid to late diastole

# Summary



- A. Presystolic murmur
  - Mitral/Tricuspid stenosis
- B. Mitral/Tricuspid regurg.
- C. Aortic ejection murmur
- D. Pulmonic stenosis (spilling through S20)
- E. Aortic/Pulm. diastolic murmur
- F. Mitral stenosis w/ Opening snap
- G. Mid-diastolic inflow murmur
- H. Continuous murmur of PDA