

# Heart Sounds & Cardiac Murmurs

By

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# Learning Objectives

- 1. Introduction**
- 2. Methods of study of heart sounds**
  - 1. Auscultation**
  - 2. Microphone**
  - 3. Phonocardiogram**
- 3. Types of Heart Sounds**
  - 1. First heart sound**
  - 2. Second heart sound**
  - 3. Third heart sound**
  - 4. Fourth heart sound**
- 4. Auscultatory Areas**
- 5. Applied Physiology-Cardiac Murmurs**

# Introduction

- **A total of four (4) heart sounds**
- **Are produced by**
- **The certain mechanical activities**
- **During each cardiac cycle**

# Introduction

- **The study of heart sounds**
- **Is important**
- **For the diagnostic value in the many heart diseases.**

# Methods of study of Heart sounds

- **Auscultation with the stethoscope**
- **The First and Second heart sound can be heard with the help of stethoscope.**

# Methods of study of Heart sounds

- **By using Microphone**
- **The amplified heart sounds**
- **Can be heard with using loud speaker.**

# Methods of study of Heart sounds

- **Phonocardiogram:**
- **Graphical record of all four heart sounds achieved by placing an electronic sound transducer over the chest and connecting it to a recording device like polygraph.**

# Heart Sounds

- 1. Cause**
- 2. Characteristics**
- 3. Duration**
- 4. Frequency**
- 5. Site of auscultation**
- 6. Correlation with ECG**

# First Heart Sound

- **Cause:**
- **Produced by the vibration set up by the sudden closure of AV (Atrio-Ventricular) valves (Mitral & Tricuspid) at the start of ventricular systole during phase of Isovolumic Contraction**

# First Heart Sound

- **Characteristics:**
- **Long, Soft and Low Pitched.**
- **Duration:**
- **0.15 seconds**
- **Frequency :**
- **25-45 Hz**
- **It sounds like the spoken word**
- **LUBB**

# First Heart Sound

- **Site of Auscultation :**
- **Can be heard by over the Mitral and Tricuspid Areas.**
- **Mitral area:**
- **Located in the 5<sup>th</sup> ICS just inside the Midclavicular Line.**
- **Tricuspid area:**
- **Located in the 5<sup>th</sup> ICS near the lower end of the sternum.**

# First Heart Sound

- **Correlation with ECG:**
- **First heart sound coincides with the**
- **Peak of R Wave in ECG**
- **If heart sound Coincides with Carotid Arterial**  
**Pulse it is called 1<sup>st</sup> heart sound → Clinically**

# Second Heart Sound

- **Cause:**
- **Vibration associated with Closure of Semilunar Valves (Aortic and Pulmonary valves)**
- **Just at the onset of the ventricular diastole.**

# Second Heart Sound

- **Characteristics:**
- **Short, Loud and High Pitched.**
- **Duration:**
- **0.12 seconds**
- **Frequency :**
- **50 Hz**
- **It sounds like the spoken word**
- **DUBB**

# Second Heart Sound

- **Site of Auscultation :**
- **Can be heard by over the Aortic and Pulmonary Areas.**
- **Aortic area:**
- **Located in the 2<sup>nd</sup> ICS near the sternum on right side**
- **Pulmonary area:**
- **Located in the 2<sup>nd</sup> ICS near the sternum on left side.**

# Second Heart Sound

- **Correlation with ECG:**
- **Second heart sound coincides with the End of the T Wave in ECG**
- **If heart sound follows Carotid Artery Pulse it is called 2<sup>nd</sup> heart sound clinically.**

# Third Heart Sound

- **Cause:**
- **The vibration set up in the cardiac wall by the inrush of the blood during Rapid Passive Filling Phase (0.11 sec) of the Ventricular Diastole**

# Third Heart Sound

- **Normally → Can not be heard with stethoscope**
- **Correlation with the ECG:**
- **Appears between the T and P wave of ECG**

# Fourth Heart Sound

- **Cause:**
- **Caused by the vibration set up during Atrial Systole**
- **During Last Rapid Filling Phase of Ventricular Diastole (0.1 sec) → Co-insides with Atrial systole**

# Fourth Heart Sound

- **Normally can not be heard with stethoscope.**
- **Correlation with the ECG: coincide with the**  
**Interval between**
- **The end of the P wave and onset of Q wave**

# Cardiac Murmurs

- **The abnormal heart sounds**
- **Produced during the cardiac cycle**

# Mechanism of Production :Cardiac Murmurs

- **Produced by**
- **The turbulent blood flow Or by**
- **Change in the direction of the blood flow**
- **Through valves**

# Mechanism of Production :Cardiac Murmurs

- **Normally blood flows through the heart**
- **And the blood vessels as**
- **The linear flow which is stream lined and silent.**

# Mechanism of Production :Cardiac Murmurs

- **The turbulent blood flow**
- **On the other hand**
- **Produces → Vibration in the tissues**
- **That are heard as → Murmurs**

# Valvular Causes of Cardiac Murmurs

- 1. Valvular Stenosis:** Narrowing or stiffening of any cardiac valves.
- 2. Valvular Insufficiency:** Regurgitation / Leakage of any cardiac valves

# **Congenital Causes of Cardiac Murmurs**

- 1. Ventricular Septal Defect (VSD):** Congenital hole in the ventricular septum.
- 2. Atrial Septal Defect (ASD):** Congenital hole in the interatrial septum.

# Congenital Causes of Cardiac Murmurs

- 5. Coarctation of Aorta:** Congenital narrowing of the systemic aorta.
- 6. Patent Ductus Arteriosus (PDA):** Congenital defect-backward flow of blood from aorta to the pulmonary artery.

# Types of Cardiac Murmurs

- **Depending upon the timings of appearance these have been classified as :**
- **Systolic murmurs:** Produced during the systole
- **Diastolic murmurs:** Produced during the diastole
- **Continuous murmurs:** Produced continuously

# Cardiac Murmurs

- **Sites of auscultation:** The murmurs best heard by placing the stethoscope on the chest wall closer to their origin
- **E.g. Aortic area, Pulmonary area, Mitral area or Tricuspid area**

# Systolic Cardiac Murmurs

1. **Aortic / Pulmonary valve Stenosis (AS / PS)**
2. **Mitral / Tricuspid valve insufficiency (Regurgitation)**  
**(MR / TR)**
3. **VSD (Ventricular Septal Defect)**
4. **ASD (Atrial Septal Defect)**
5. **Coarctation of Aorta (Congenital Narrowing of Aorta)**
6. **Anaemia**

# Diastolic Cardiac Murmurs

**1. Aortic / Pulmonary valve insufficiency**

**(Regurgitation) (AR / PR)**

**2. Mitral / Tricuspid valve stenosis (MS / TS)**

# Continuous Cardiac Murmurs

**Heard through out systole and diastole**

- 1. PDA (Patent Ductus Arteriosis)**