



HEART SOUNDS



INTRODUCTION

- ❖ Heart sounds are the sounds produced by mechanical activities of heart during each cardiac cycle.**
- ❖ Heart sounds are produced by :**
 - 1. Flow of blood through cardiac chambers**
 - 2. Contraction of cardiac muscle**
 - 3. Closure of valves of heart**



DIFFERENT HEART SOUNDS

- ❖ **First and second heart sounds are called classical heart sounds and are heard by using stethoscope.**
- ❖ **First two sounds are more prominent and resemble the spoken words “ LUBB “ and “ DUBB “**
- ❖ **Third sound is mild and heard by microphone.**
- ❖ **Fourth heart sound is an inaudible sound and audible in pathological conditions.**

IMPORTANCE

- ❖ **Important diagnostic value which indicates diseases involving valves of the heart.**



FIRST HEART SOUND

Produced during ISOMETRIC CONTRACTION period and part of ejection period

Main cause is the sudden closure of Atrioventricular valve.

Other factors

- 1. Valvular factor – synchronous closure of AV valves set up vibrations in valvular leaflets and chordae tendinae.**
- 2. Vascular – Rush of blood from ventricles into aorta and pulmonary artery.**
- 3. Myocardial tension and contraction of ventricles**
- 4. Vibrations produced during atrial systole.**



- **Long ,soft, and low -pitched sound.**
- **Resembles Spoken word -LUBB**
- **Frequency - 25 to 40 cycles /second**

Applied physiology

- **1.Reduplication of first heart sound**
- **Pathological splitting occurs in stenosis of AV valves and atrial septal defect.**
- **2. Soft sound in low blood pressure ,severe heart failure,myocardial infarction and myxedema.**
- **3.Louder in mitral stenosis, wolff-parkinson -white syndrome.**
- **Coincides with R wave in ECG.**



SECOND HEART SOUND

- **Produced at the end of protodiastolic period**
- **Due to sudden closure of semilunar valves.**
- **It is a short, sharp and high -pitched sound.**
- **Resembles the word DUBB**
- **Duration - 0.10 to 0.14 second**
- **Frequency - 50 cycles/second**



APPLIED PHYSIOLOGY

Physiological splitting: Normally aortic valve closes prior to the closure of pulmonary valve .

- Interval between two valves widens during inspiration and narrows during expiration.
- Increased negative Intra thoracic pressure during inspiration increases lung expansion and venous return
- Venous return from lungs to left atrium is reduced .
- Increased venous return in right atrium and increased blood volume in right ventricle causes pulmonary valve closure slightly longer than aortic valve.



Pathological splitting

- **Pulmonary stenosis**
- **Right bundle branch block**
- **Right ventricular hypertrophy**
- **Reverse splitting : Splitting of second heart sounds in which aortic valve closes after closure of pulmonary valve due to delay in emptying of left ventricle called paradoxical splitting.**
- **LOUD ACCENTUATED SECOND HEART SOUND.**
- **Aortic valve produces loud sound during systemic hypertension and coarctation of aorta**
- **Pulmonary valve produces during pulmonary stenosis**
- **Soft heart sound in heart failure.**



THIRD HEART SOUND

Low pitched sound that is produced during rapid filling period of cardiac cycle called ventricular gallop or protodiastolic gallop

Causes : Rushing of blood into ventricles and vibrations set up in the ventricular wall during rapid filling phase.

Characteristics : Short and low-pitched sound

Duration – 0.07 – 0.10 sec Frequency - 1 to 6 cycles /second.

Audible by stethoscope : Triple heart sound. In condition like aortic regurgitation ,cardiac failure and cardiac myopathy .

In ECG , sound appears between T and P waves .



FOURTH HEART SOUNDS

- **Inaudible sound. Studied only by graphical recording ,by phonocardiography.**
- **Sound produced during atrial systole and considered as physiological atrial sound.**
- **Also called atrial gallop or presystolic gallop.**
- **Causes : Produced by contraction of atrial musculature and vibrations set up in atrial musculature ,flaps of AV valves during systole.**
- **Characteristics : Short and low –pitched sound.**
- **Duration : 0.02 to 0.04 sec.**
- **Frequency : 1 to 4 cycles /second.**



Audible FOURTH HEART SOUND



When ventricles become stiff

- **Occurs in ventricular hypertrophy ,long standing hypertension and aortic stenosis.**
- **ECG - Coincides with interval between the end of P wave and onset of Q wave.**

TRIPLE HEART SOUND or GALLOP RHYTHM

- **An abnormal rhythm of heart , characterised by three clear heart sounds during each heart beat.**
- **Third and fourth sound heard besides first and second heart sounds.It is called gallop rhythm.**
- **Produced in MI and severe hypertension.**



❖ **Quadriple heart sound.**

Abnormal rhythm of heart characterised by four clear sounds during each heart beat called quadruple rhythm also called quadruple gallop. Produced in congestive heart failure.

Summation gallop

Whenever there is tachycardia in patients, with quadruple heart sound, third and fourth heart sound merge together and give rise to single sound called summation gallop.



AUSCULTATION AREAS

· BY STETHESCOPE :

- Chest piece of stethoscope is placed over four areas on the chest ,which are called auscultation areas.
 - 1. Mitral area
- Left 5 th intercostal space ,about 10 cm away from the midclavicular line.First sound is well transmitted called APEX BEAT AREA.
- Apex beat thrust of the apex of ventricles against the chest wall during systole
 - 2. Tricuspid area.
- Tricuspid area is on xiphoid process . Sound produced by closure of tricuspid valve transmitted well into the area.
 - 3.Pulmonary area
- Pulmonary area is on left 2 nd intercostal ,close to sternum . Second heart sound well heard .
 - 4.Aortic area
- Over the right 2 nd intercostal space, close to the sternum.



By Microphone and Phonocardiogram



- ❖ **Microphone placed over the chest and heart sounds are amplified by means of amplifier and heard by a loudspeaker.**
- ❖ **Phonocardiogram is the graphical record of heart sounds.**
- ❖ **Transducer placed over the chest and connected to a recording device like polygraph .**
- ❖ **It helps to analyse the frequency of the heart sounds**
- ❖ **First – 9 to 13 waves**
- ❖ **Second – 4 to 6 waves**
- ❖ **Third – 1 to 4 waves**
- ❖ **Fourth – 1 to 2 waves.**