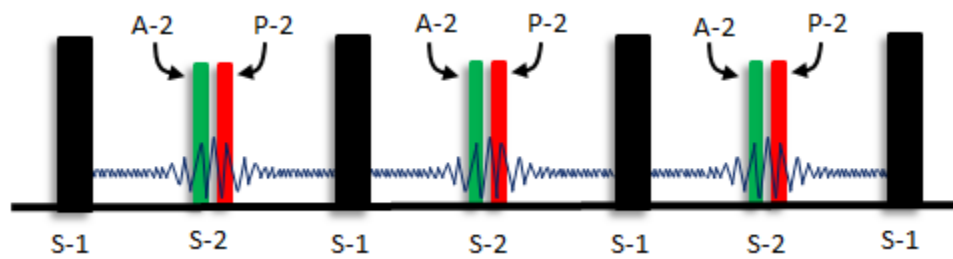


## HEART SOUNDS – MURMURS



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## Introduction

Murmur: a low, indistinct sound. In terms of medicine, it is the sound produced due to turbulent flow within the heart and great vessels. They are described and named in relation to the normal heart sounds, location, and quality

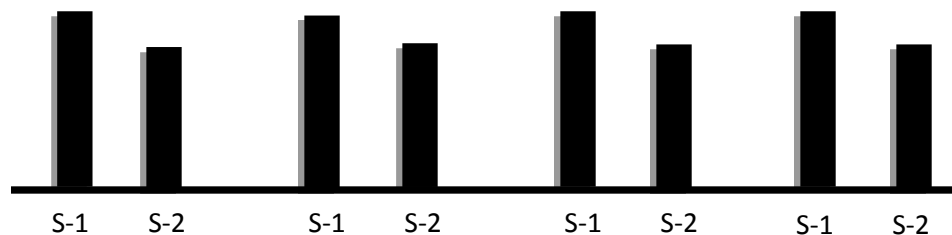
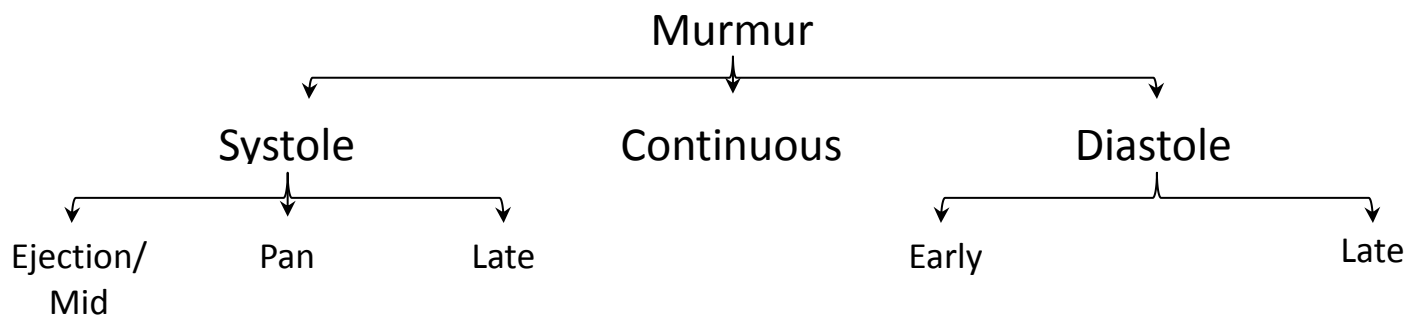


Fig. 1 Normal Heart Sounds.

**Conditions where murmur may be heard:**

- ✓ **Pathological Heart Valve – Rheumatic Heart Disease, Degenerative Valves.**
- ✓ **Abnormal Communications of the Heart – Defects of Septum, PDA.**

A heart murmur may always not be indicative of a structural abnormality. In situations causing hyper-dynamic circulation turbulence is created across the valves causing an INNOCENT MURMUR.



Flowchart. 1 Outline of Murmurs

	Incomplete Opening	Incomplete Closure
	Stenosis	Regurgitation/Insufficiency
A-V Valve	Diastolic Murmur	Systolic Murmur
Outflow Valve	Systolic Murmur	Diastolic Murmur

Table. 1 Timing of Murmurs in Valvular Disorders.

**Location of the Murmur best heard: Towards the direction of the flow of blood. (In case of stenosis)**

Valve	Disorder	Timing of Murmur	Location	Common Causes
<b>Mitral Valve</b>	Stenosis	V. Diastole	Mitral Area (Lt. 5 <sup>th</sup> ICS@ MCL%)	RHD*
	Regurgitation	V. Systole	Best Heard – Lt. Axilla	MVP#, RHD*, IE\$
<b>Aortic Valve</b>	Stenosis	V. Systole	Aortic Area (Rt. 2 <sup>nd</sup> ICS@ Sternal Border)	Calcification, RHD*
	Regurgitation	V. Diastole	Erb's Point (Lt. 3 <sup>rd</sup> ICS@ Sternal Border)	RHD*, IE\$
<b>Tricuspid Valve</b>	Stenosis	V. Diastole	Tricuspid Area (Lt. 4 <sup>th</sup> ICS@ Sternal Border)	RHD*
	Regurgitation	V. Systole	Tricuspid Area (Lt. 4 <sup>th</sup> ICS@ Sternal Border)	Rt.VD**, RHD*
<b>Pulmonary Valve</b>	Stenosis	V. Systole	Pulmonary Area (Lt. 2 <sup>nd</sup> ICS@ Sternal Border)	CHD***
	Regurgitation	V. Diastole	Lt. 3 <sup>rd</sup> , 4 <sup>th</sup> ICS@ Sternal Border)	P.HTN^^, IE\$

@-Intercostal Space, %-Mid Clavicular Line, \*-Rheumatic Heart Disease, #-Mitral Valve Prolapse,  
 \$-Infective Endocarditis, \*\*-Right Ventricular Dilation, \*\*\*-Congenital Heart Disease,  
 ^^Pulmonary Hypertension

Table. 2 Types of Valvular disorders.

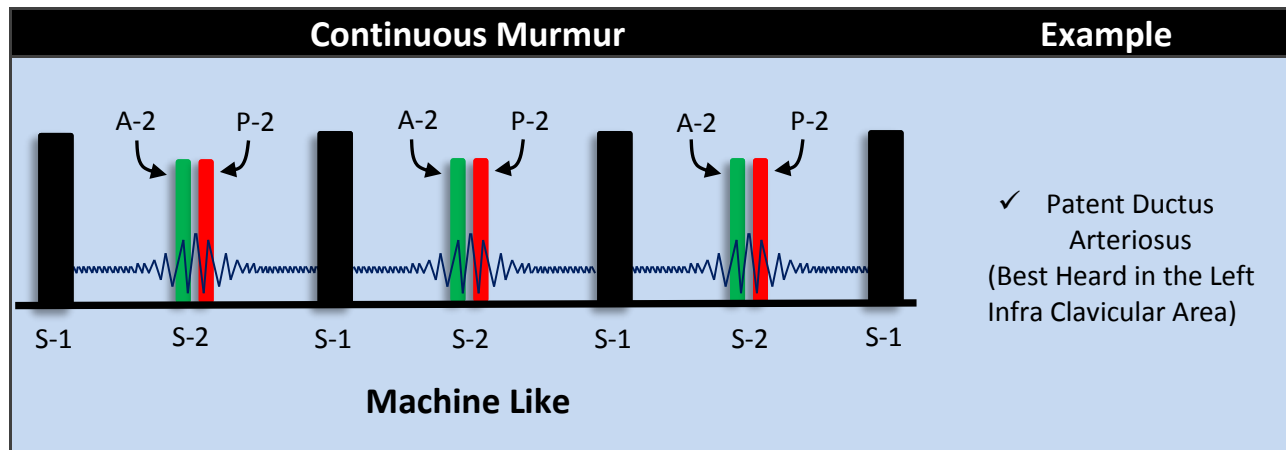


Table. 3 Continuous Murmur.

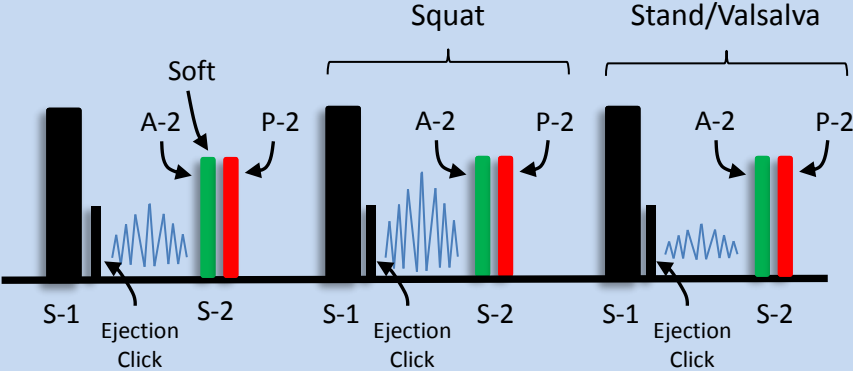
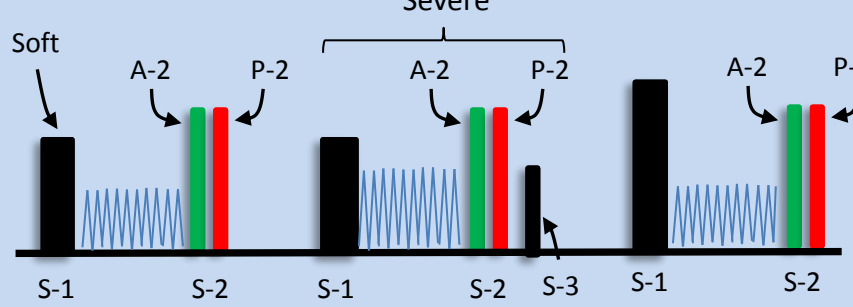
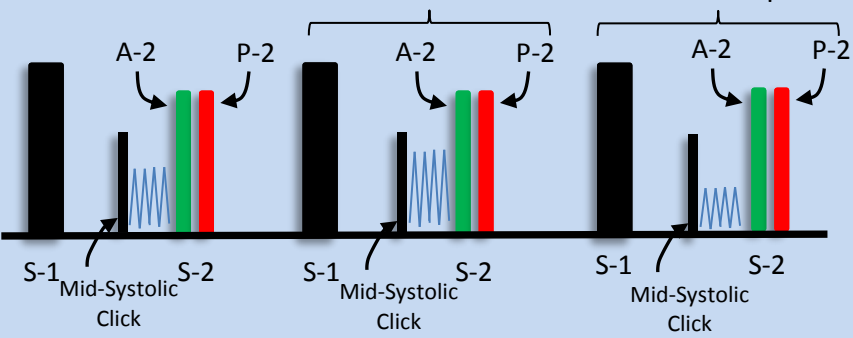
Systolic Murmur	Example
<p style="text-align: center;">Squat                      Stand/Valsalva</p>  <p style="text-align: center;"><b>Mid Systolic, Crescendo-Decrescendo</b></p>	<ul style="list-style-type: none"> <li>✓ Aortic Stenosis (S-2 Soft)</li> <li>✓ Pulmonary Stenosis</li> </ul>
<p style="text-align: center;">Severe</p>  <p style="text-align: center;"><b>Pan Systolic</b></p>	<ul style="list-style-type: none"> <li>✓ Mitral Regurgitation (S-1 Soft)</li> <li>✓ Tricuspid Regurgitation</li> <li>✓ Ventricular Septal Defect (Loudest at Tricuspid Area)</li> </ul>
<p style="text-align: center;">Valsalva                      Hand Grip</p>  <p style="text-align: center;"><b>End Systolic</b></p>	<ul style="list-style-type: none"> <li>✓ Mitral Valve Prolapse</li> </ul>

Table. 4 Systolic Murmurs.

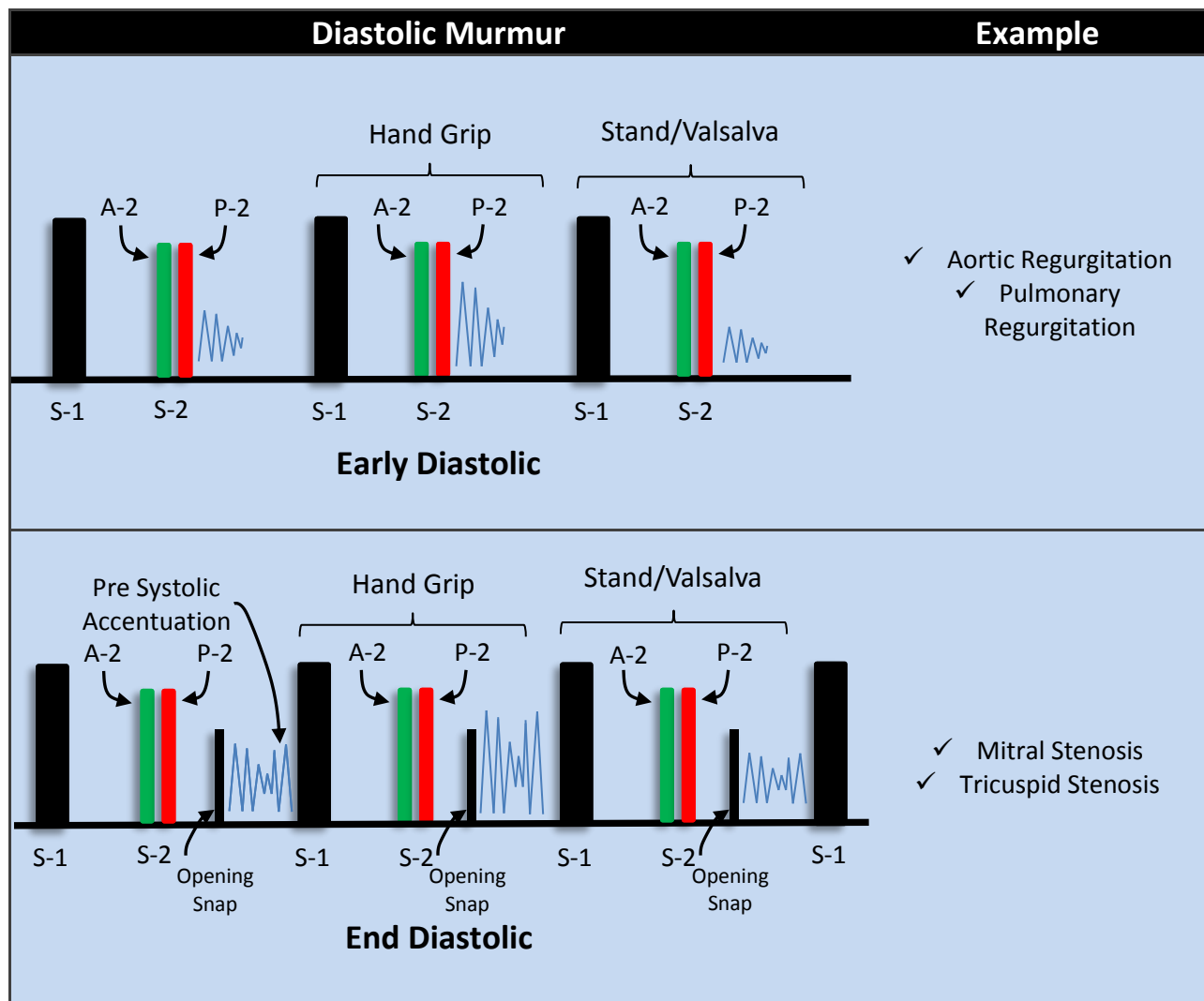


Table. 5 Diastolic Murmurs.

Grade of Murmur	Description
1/6	Faint, audible only on special manoeuvres/positions over a specific localization
2/6	Soft
3/6	Loud, without thrill
4/6	Loud, with thrill
5/6	Very Loud, with thrill, heard when stethoscope is partially off the chest
6/6	Very Loud, with thrill, heard without stethoscope

✓ A Systolic Murmur from grade of 3/6 is considered significant.  
✓ A Diastolic Murmur of any grade is significant and organic. (Diastolic Murmurs are graded into 4).

Table . 6 Grades of Murmurs

Special Manoeuvres	Effect on Murmurs
Inspiration (↑ Venous Return)	Increase – Right Sided Murmur
Expiration (↑ Afterload)	Increase – Left Sided Murmur
Hand Grip (↑ Afterload)	Increase – Left Sided Murmur Decrease – HOCM, MVP, Aortic Stenosis
Valsalva or Stand (↓ Preload, ↓ Afterload)	Increase – HOCM, MVP Decrease – Most murmurs
Squat (↑ Preload, ↑ Afterload)	Increase – AS, MR, VSD Decrease – HOCM, MVP

Table. 7 Variations in Loudness based on special manoeuvres.

Condition	Murmur	Eponym
Tricuspid Regurgitation	Systolic Murmur	Carvallo Murmur
Innocent Murmur	Systolic Murmur	Still's Murmur
Ventricular Septal Defect	Systolic Murmur	Roger's Murmur
Aortic Regurgitation	Diastolic Murmur	Austin Flint Murmur
Pulmonary Regurgitation	Diastolic Murmur	Graham Steell Murmur
Rheumatic Heart Disease – Mitral Stenosis	Diastolic Murmur	Carry Comb's Murmur
Patent Ductus Arteriosus	Continuous Murmur	Gibson Murmur

Table. 8 Murmurs with Eponyms.

### *Summary*

- ✓ A murmur is the sound produced due to turbulent flow within the heart and great vessels. If within the heart, it may be due to degenerative valves or developmental defects.
- ✓ Murmur can be classified into Systolic Murmurs, Diastolic Murmurs and Continuous Murmurs.
- ✓ They are graded from 1 to 6 based on the intensity they produce and few additional characteristics.
- ✓ Murmurs are not always constant in nature, but change during the phases of respiration and few manoeuvres.

### *References*

1. Harrison's Principles of Internal Medicine, 20<sup>th</sup> Edition.
2. Bates' Guide to Physical Examination and History Taking, 10<sup>th</sup> Edition.
3. Hutchinson's Clinical Methods, 23<sup>rd</sup> Edition.
4. First Aid for USMLE Step 1, 2019.