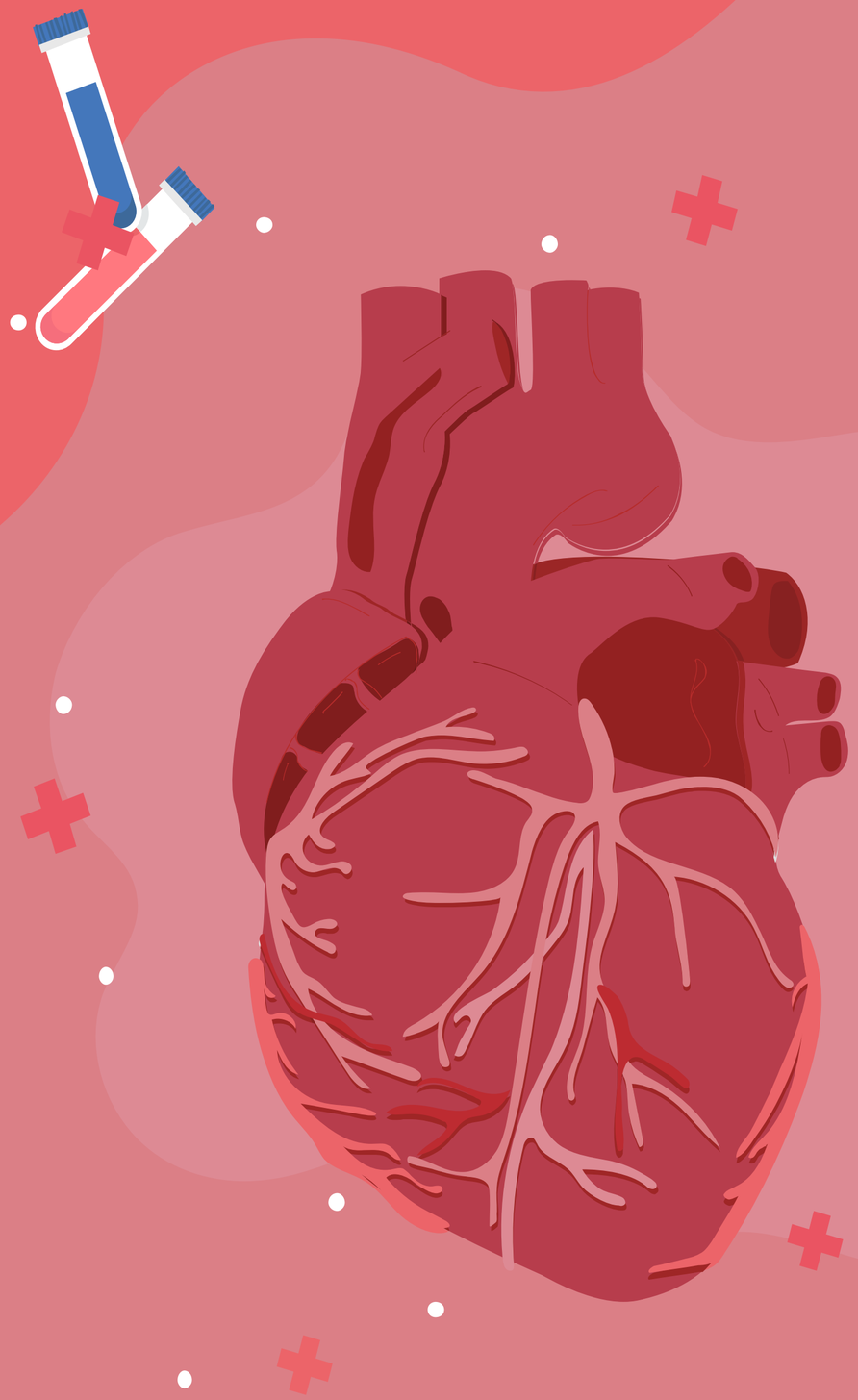
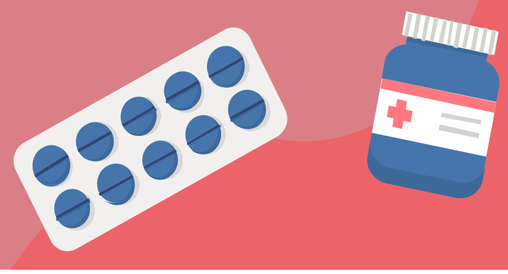


CVS Summary

Written By: Shahd Alahmad

Corrected By: Mays Qashou



A. Murmurs

Type	Timing	Duration	Character	Pitch	Location	Radiation	Associated Conditions
Aortic stenosis	Systolic	Crescendo–decrescendo	Harsh / Musical (children)	High	Right 2nd ICS	Carotids, suprasternal notch	Ejection click, thrill, reversed S2
Mitral regurgitation	Systolic	Pansystolic	Blowing	High	Apex	Left axilla	Displaced apex beat, thrill
Tricuspid regurgitation	Systolic	Pansystolic	Blowing	-	Lower left sternal edge	-	Prominent V wave in JVP, pulsatile liver
VSD	Systolic	Pansystolic	Harsh	-	Left sternal border	Right sternal border	Thrill, post-MI septal rupture
HOCM	Systolic	Ejection-type	Harsh	-	Left sternal edge/apex	-	Increases with Valsalva, double impulse
Aortic regurgitation	Early Diastolic	Decrescendo	Blowing	Low	Rt 2nd ICS, Lt 3rd ICS (Erb's)	-	Systolic flow murmur, wide PP, thrill
Pulmonary regurgitation	Early Diastolic	Decrescendo	Blowing	High	Left 2nd–3rd ICS (Graham Steel)	-	Pulmonary hypertension, congenital
Mitral stenosis	Diastolic	Late	Rumbling	Low	Apex	-	Opening snap, exercise accentuates
Austin Flint murmur	Diastolic	Mid	Rumbling	-	Apex	-	AR-related LV inflow obstruction
PDA	Continuous	Continuous	Machinery-like	High	Left upper sternal edge	Left scapula	Wide PP, thrill
Still's murmur (innocent)	Systolic	Vibratory	Musical/vibratory	Medium	Left lower sternal border	-	Childhood, benign

---

B. Grades of Murmur Intensity

Grade	Description
1	Heard by expert in optimum conditions
2	Heard by non-expert in optimum conditions
3	Easily heard, no thrill
4	Loud murmur with a thrill
5	Very loud, over large area, with thrill
6	Extremely loud, heard without stethoscope

C. Added Heart Sounds

Sound	Timing	Character	Best Heard At	Associated Conditions
Opening snap	Early diastole (after S2)	High-pitched	Medial to apex with diaphragm	Mitral stenosis
Ejection click	Early systole (after S1)	High-pitched	Rt/Lt upper sternal borders with diaphragm	Congenital aortic/pulmonary stenosis
Mid-systolic click	Mid-systole	High-pitched	Apex with diaphragm	Mitral valve prolapse
Mechanical mitral valve	Diastole/Systole	Loud S1 + opening snap	-	Valve closure + opening
Mechanical aortic valve	Systole/Diastole	Loud S2 + ejection click	-	Valve closure + opening
Pericardial rub	Often Biphasic	Coarse, scratchy	**(patient holding breath in expiration +lean forward) may be audible over any part of the precordium but often localized**	Acute pericarditis, post-MI

D. Gallop Sounds

Sound	Timing	Pitch	Best Heard At	Physiologic In	Pathologic In	Notes
S3	Early diastole	Low	Apex (bell)	Children, pregnancy, febrile, young adults	LV failure, MR, dilated cardiomyopathy	S3 + tachycardia = ventricular gallop
S4	Late diastole	Low	Apex (bell)	-	HTN, AS, HCM, restrictive or hypertrophic cardiomyopathy	Absent in AF, = atrial gallop

---

E. Thrill Locations

Location	Associated Condition
Apex	MR, MS (if severe)
Right upper sternal border	Aortic stenosis
Left & Right sternal borders	VSD
Left infraclavicular area	PDA

F. Heaves

Type	Cause(s)
Apical heave	LV hypertrophy, Aortic regurgitation (chronic overload)
Left parasternal heave (RV heave)	RV hypertrophy or dilation

G. Murmur Timing Classification

Timing	Murmur Types	Example Conditions
Systolic	Ejection systolic, Pansystolic	AS, PS, HOCM, MR, TR, VSD
Diastolic	Early, Mid, Late diastolic	AR, PR, MS, Austin Flint, TS (rare)
Continuous	Continuous murmur	PDA

H. Sound Characteristics by Pathology

Character	Description	Example Conditions
Harsh	Rough grating sound	AS, VSD
Blowing	High-frequency	MR, AR, PR, TR
Rumbling	Low-pitched vibration	MS, TS, Austin Flint
Musical	Vibratory or tuneful	Still's murmur
Machinery	Mechanical, continuous	PDA

I. Dynamic Auscultation

Maneuver	Effect	Diagnostic Use
Valsalva	↓ Preload → ↓ most murmurs, ↑ HOCM	HOCM identification
Standing	↓ Preload	↑ HOCM, ↓ AS/MS murmurs
Squatting	↑ Preload and afterload	↑ AS/MS, ↓ HOCM murmur
Inspiration	↑ Venous return to right heart	↑ Right-sided murmurs (e.g., TR)
Expiration	↑ Left-sided sounds	↑ MR, MS, AR
Leaning forward	Brings AR murmur closer to chest wall	Aortic regurgitation

---

J. Sound Absences / Dx.

- **S2 splitting**
  - Fixed: **ASD** → diagnostic hallmark
  - Reversed: **AS, HOCM, LBBB**
  - Single S2: **Severe AS** (absent A2)
- **S4**
  - Absent in **atrial fibrillation**
- **Ejection click**
  - Absent if **valve is calcified** (rigid)

K. Clinical Associations

Condition	Precordial Findings
Aortic stenosis	Apical heave, thrill (RUSB), S4, ejection click, reversed S2, pulsus parvus et tardus(=slow rising pulse), reduced pulse volume, narrow pulse pressure, reduced S2
Mitral regurgitation	Displaced apex, third heart sound, blowing murmur, left axilla radiation, thrill
Mitral stenosis	Tapping apex, opening snap, loud S1, mid-diastolic murmur, low pulse volume
Aortic regurgitation	Large pulse volume, collapsing pulse, wide pulse pressure, prominent carotid pulsations (Corrigan's sign), Displaced apex beat
HOCM	Double impulse, bisferiens pulse, systolic murmur ↑ with Valsalva, reversed S2
VSD	Harsh pansystolic murmur, thrill (sternal borders), wide S2 split
TR (pulmonary HTN)	Giant V wave in JVP, right parasternal heave, Graham Steel murmur

PDA	Machinery murmur, bounding pulse, thrill (infraclavicular), wide pulse pressure

L. Second Heart Sound (S2): Abnormal Intensity and Splitting
S2 Intensity Variations:

Intensity	Cause
LOUD (A2)	Systemic hypertension
LOUD (P2)	Pulmonary hypertension
QUIET A2	Low cardiac output, Calcific AS, AR

S2 Splitting Patterns

Type	Description / Timing	Associated Conditions
Normal Splitting	Widens during inspiration	Physiologic due to delayed RV ejection
Wide Splitting	Exaggerated in inspiration	RBBB, Pulmonary stenosis, Pulmonary HTN, VSD
Reversed Splitting	Widens in expiration	Aortic stenosis, HOCM, LBBB, Ventricular pacing
Fixed Splitting	Unchanged with respiration	ASD

• Pulses Volume & character:

Type of Volume	Description	Causes
Large pulse volume	Increased stroke volume & large pulse pressure	**Physiological**: exercise, pregnancy **Pathological**: anemia, thyrotoxicosis, aortic regurgitation
Small pulse volume	Small amplitude pulse	Severe heart failure, hypovolemia, cardiac tamponade, mitral stenosis
Asymmetric pulses	Unequal pulse volumes between limbs	Occlusive peripheral arterial disease (PAD), stenosis, aortic dissection
Radiofemoral delay	Lower limb pulses reduced & delayed compared to upper limbs	Coarctation of the aorta (usually distal to left subclavian artery)

Type of Character	Description	Causes
Slow-rising pulse	Gradual upstroke, reduced peak late in systole	Severe aortic stenosis
Collapsing pulse	Early peak followed by rapid fall in pressure; exaggerated by raising arm above the level of the heart	Severe aortic regurgitation
Pulsus bisferiens	Double systolic peak with mid-systolic dip	Aortic stenosis + aortic regurgitation HOCM
Pulsus alternans	Beat-to-beat variation in pulse volume with normal rhythm	Advanced heart failure
Pulsus paradoxus	Exaggerated decrease in pulse volume (and systolic BP) during **inspiration**; increases again during **expiration**.	Cardiac tamponade, pericardial constriction, acute severe asthma

- **JVP:**

Abnormalities	Cause
Elevation, sustained abdominojugular reflux >10 seconds, dyspnea	**Heart failure**
Elevation	any condition that leads to high right ventricular filling pressures, such as **pulmonary embolism, chronic pulmonary hypertension, cardiac tamponade**
Elevation, absent/blunted 'y' descent	**Pericardial effusion**
Elevation, Kussmaul's sign	**Pericardial constriction, severe right ventricular failure and restrictive cardiomyopathy.**
Elevation, loss of pulsation, negative abdominojugular reflux	**Superior Vena Cava obstruction (lung cancer)**
Absent 'a' wave	**Atrial fibrillation**
Giant 'a' wave	**Tricuspid stenosis**
Giant 'v' or 'cv' waves, pulsatile liver	**Tricuspid regurgitation**
'Cannon' waves	**Complete heart block**