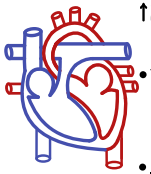
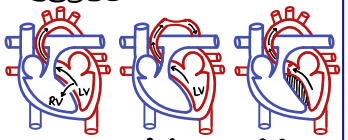
Physiology Of Murmurs



↑Re → ↑Turbulent Blood → ↑Murmur

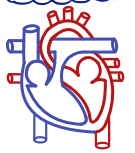
- ↑Velocity → ↑Re → ↑Contractile Strength → ↓Diameters
- ↓Viscosity → ↑Re
- Blood Flow Across An Incompetant Valve

↓Diameters



- VSD
  - Smaller VSD → ↑Velocity → ↑Murmur
- CoA
  - ↑Velocity → ↑Murmur
- A.S.
  - ↑Velocity → ↑Murmur
- HOCM
  - ↑Velocity → ↑Murmur

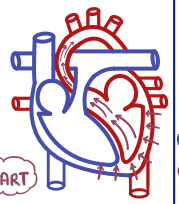
↓Viscosity



- Anemia
  - ↓Viscosity → ↑Turbulence

↑Contractility

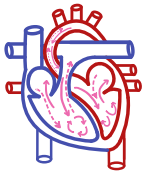
↑Force → ↑Velocity → ↑Turbulence



Hyperdynamic Heart

- ↑SNS
  - Exercise
  - Fever
  - Sepsis
  - ↑T_3 + T_4
- ↑Volume
  - Pregnancy
- ↓Of States
  - Anemia
  - Beri Beri
  - AVF

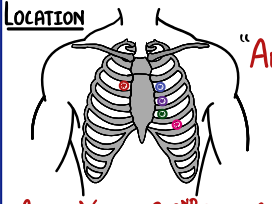
Blood Flow Across An Incompetant Valve



- A.R.
- P.R.
- M.R.
- T.R.

Location, Radiation, Pitch, Quality And Intensity Of Heart Murmurs

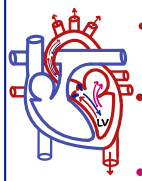
Location



"All Physicians Earn Too Much"

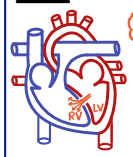
- Aortic Valve → R. 2nd I.C.S → CoA, AS, AR
- Pulmonic Valve → L. 2nd I.C.S → PS, PR, ASD
- Erbs Point → L. 3rd I.C.S → S_1 + S_2, HOCM
- Tricuspid Valve → L. 4th I.C.S → TS, TR, VSD
- Mitral Valve → L. 5th I.C.S (MCL) → MS, MR, MVP

Radiation

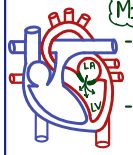


- AS
  - R. 2nd I.C.S
  - Carotids ®
- AR
  - R. 2nd I.C.S
  - L. USB ®
- MR
  - L. 5th I.C.S (MCL)
  - Axilla ®

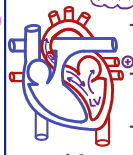
Pitch



VSD
- ↑Pressure Gradients
- ↑Pitch Murmur
- Diaphragm Of Stethoscope



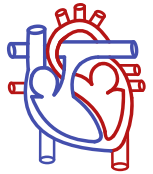
Mitral Stenosis
- ↓Pressure Gradient (Atria → Ventricle)
- ↑Blood Flow Across Valve
- Low Pitch → Bell Of The Stethoscope



Aortic Stenosis
- ↑↑Pressure Gradients
- ↑↑Blood Flow Across Valve
- ↑↑Pitch (Harsh)
- Diaphragm Of Stethoscope

±M.R.
±A.R.

Quality

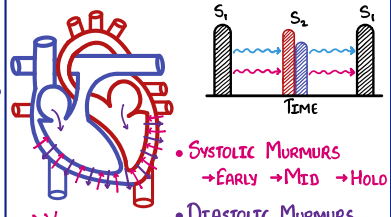


- "Blowing / Musical" → AR / MR
- "Harsh / Rumble" → AS / MS
- "Machinery" → PDA

Intensity

- Grades I - VI
- I) Difficult To Discern Murmur
- II) Faint → Heard
- III) Easily Heard
- IV) Loud Palpable Thrill
- V) Loud Palpable Thrill + Stethoscope Barely On Chest
- VI) Loud Palpable Thrill + Hover Stethoscope Over Chest
- Clinical Condition
  - → Grade < 3 → ↑↑Benign
  - → Grade 3+ → ↑↑Pathological
    - → VSD (Small) → ↑↑Grade

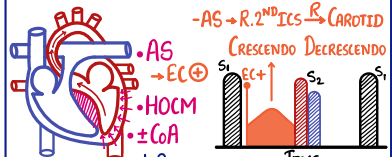
Timing And Configuration Of Heart Murmurs



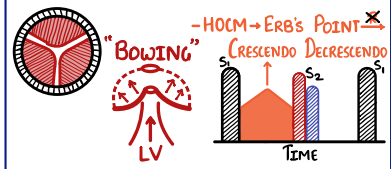
1) Ventricular Systole
+
2) Ventricular Diastole

- Systolic Murmurs → Early → Mid → Holo
- Diastolic Murmurs
- Continuous Murmurs

Early Systolic Murmurs

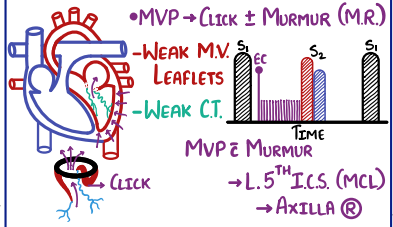


- AS → EC ⊕
- HOCM
- ±CoA
  - → L. Posterior Hemithorax
- AS → R. 2nd ICS → R Carotid
  - Crescendo Decrescendo

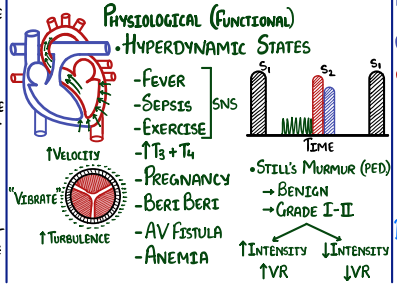


- HOCM → Erb's Point
  - Crescendo Decrescendo

Mid Systolic Murmurs

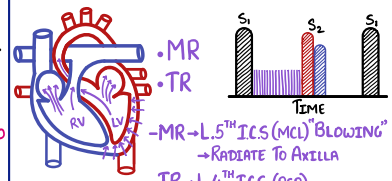


- MVP → Click ± Murmur (M.R.)
  - Weak M.V. Leaflets
  - Weak C.T.
  - MVP ≥ Murmur
    - → L. 5th I.C.S. (MCL)
    - → Axilla ®

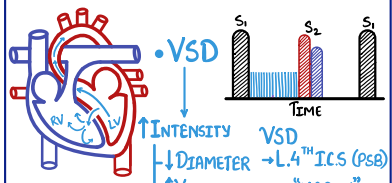


- Hyperdynamic States
  - SNS
    - Fever
    - Sepsis
    - Exercise
  - ↑T_3 + T_4
  - Pregnancy
  - Beri Beri
  - AV Fistula
  - Anemia
- Still's Murmur (PED)
  - → Benign
  - → Grade I-II
- ↑Intensity ↑VR
- ↓Intensity ↓VR

Holosystolic Murmurs

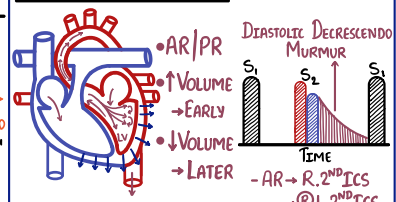


- MR
- TR
  - MR → L. 5th I.C.S (MCL) "Blowing"
    - → Radiate To Axilla
  - TR → L. 4th I.C.S (PSB)

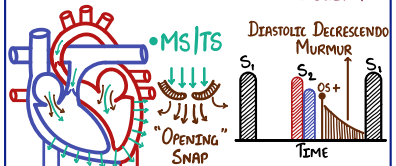


- VSD
  - ↑Intensity
    - ↓Diameter
    - ↑Velocity
  - VSD → L. 4th I.C.S (PSB)
    - "Harsh"

Diastolic Murmurs

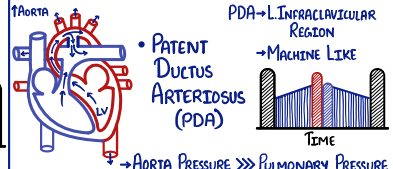


- AR / PR
  - ↑Volume → Early
  - ↓Volume → Later
- Diastolic Decrescendo Murmur
  - AR → R. 2nd ICS → ® L. 2nd ICS → Blowing



- MS / TS
  - "Opening Snap"
  - ↑Volume (Early) → ↑Velocity
  - ↓Volume (Later) → ↓Velocity
- Diastolic Decrescendo Murmur
  - MS → L. 5th ICS (MCL) → "Rumble"

Continuous Murmurs

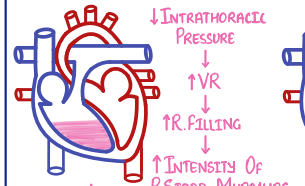


- Patent Ductus Arteriosus (PDA)
  - PDA → L. Infraclavicular Region → Machine Like
  - → Aorta Pressure ⋙ Pulmonary Pressure → Systolic + Diastolic
  - → Constant Shunt From Aorta → Pulm. Artery

DDx: R. Infraclavicular Murmur
- Cervical Venous Hum
- Flex Neck → ↓Intensity

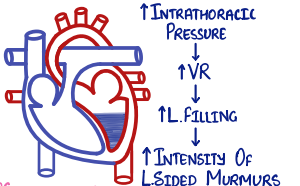
Murmur Accentuation Maneuvers

Inspiration



- ↓Intrathoracic Pressure → ↑VR → ↑R. Filling → ↑Intensity Of R. Sided Murmurs
  - T.S. / T.R.
  - P.S. / P.R.

Expiration



- ↑Intrathoracic Pressure → ↓VR → ↓L. Filling → ↓Intensity Of L. Sided Murmurs
  - M.S. / M.R.
  - A.S. / A.R.

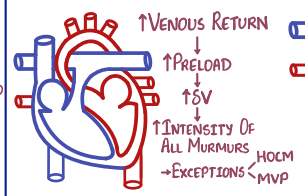
Leaning Forward

Brings Aorta + A. Valve Close To Chest Wall → ↑Intensity Of Murmurs
- AS
- AR
- HOCM
- CoA

Left Lateral Decubitus

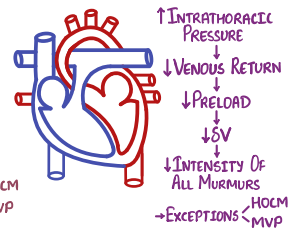
Brings M.V Close To Chest Wall → ↑Intensity Of Murmurs
- MS
- MR
- MVP

Squatting / PLR

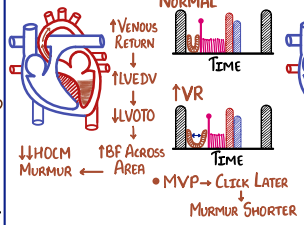


- ↑Venous Return → ↑Preload → ↑SV → ↑Intensity Of All Murmurs → Exceptions < HOCM, MVP

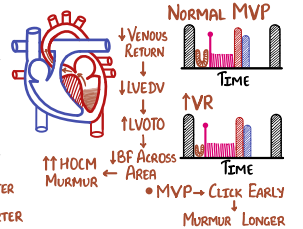
Valsalva / Standing



- ↑Intrathoracic Pressure → ↓Venous Return → ↓Preload → ↓SV → ↓Intensity Of All Murmurs → Exceptions < HOCM, MVP



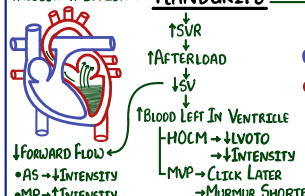
- ↑Venous Return → ↓LVEDV → ↓LVOTO → ↓↓HOCM Murmur ← ↑BF Across Area
- Normal
- ↑VR
- MVP → Click Later → Murmur Shorter



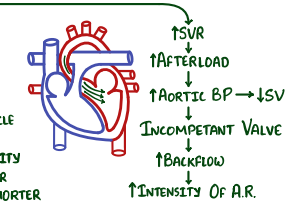
- ↓Venous Return → ↓LVEDV → ↓LVOTO → ↑↑HOCM Murmur ← ↓BF Across Area
- Normal MVP
- ↑VR
- MVP → Click Early → Murmur Longer

Handgrips

Vasoconstriction ←



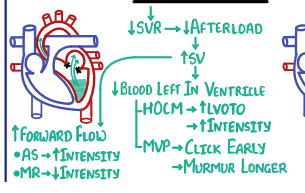
- ↑SVR → ↑Afterload → ↓SV → ↓Forward Flow
  - AS → ↓Intensity
  - MR → ↑Intensity
- ↑Blood Left In Ventricle
  - HOCM → ↓LVOTO → ↓Intensity
  - MVP → Click Later → Murmur Shorter



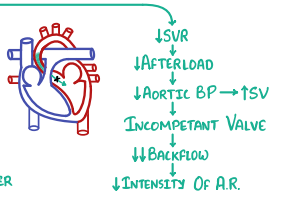
- ↑SVR → ↑Afterload → ↑Aortic BP → ↓SV → Incompetant Valve → ↑Backflow → ↑Intensity Of A.R.

Amyl Nitrate

Vasodilate ←



- ↓SVR → ↓Afterload → ↓SV → ↓Forward Flow
  - AS → ↑Intensity
  - MR → ↓Intensity
- ↓Blood Left In Ventricle
  - HOCM → ↑LVOTO → ↑Intensity
  - MVP → Click Early → Murmur Longer



- ↓SVR → ↓Afterload → ↓Aortic BP → ↑SV → Incompetant Valve → ↓↓Backflow → ↓Intensity Of A.R.

Heart Murmurs

Jhi. G

NINJA NERD