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| **Jugular venous pulse (JVP)** | | |
| **A wave** | **Atrial contraction** | **Absent: atrial fibrillation** |
| **C wave** | **RV contraction**  (closed tricuspid bulging) |  |
| **X descent** | **Atrial relaxation**  Tricuspid valve moves downward | **Absent: tricuspid regurgitation**  **Prominent: right HF** |
| **V wave** | **Right atrium filling**  Closed tricuspid valve |  |
| **Y descent** | **Atrium empties** into ventricle | **Prominent: constrictive pericarditis**  **Absent: cardiac tamponade** |
| **Heart Sounds** | | |
| **S1** | **Mitral** valve closure  **Tricuspid** valve closure |  |
| **S2** | **Aortic** valve closure  **Pulmonary** valve closure |  |
| **S3** | Early diastole  **Increased filling pressures** | Dilated ventricles (**CHF**)  Mitral regurgitation  **Normal in younger people** |
| **S4** | **Atrial kick**  (forcing blood into noncompliant ventricle) | **LV hypertrophy**  (**prolonged HTN**)  Always abnormal |
| **Splitting of S2 (Aortic then Pulmonic)** | | |
| **Normal** | **Inspiration increases venous return**  Incr. RV stroke volume – delayed pulmonic valve closure | |
| **Wide** | **Exaggerated normal splitting**  Delayed RV emptying | **Pulmonic stenosis**  Right bundle branch block |
| **Fixed** | **Inc. RV volume**  Pulmonic closure always delayed | **ASD**  (left to right shunt) |
| **Paradoxical** | **Delayed aortic valve closure**  (P2 before A2)  **Splitting heard better w/ expiration** | **Aortic stenosis**  Left bundle branch block |

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| **Bedside Maneuvers** | | |
| **Inspiration** | **Increase venous return** | **Increases R heart sound intensity** |
| **Hand grip** | **Increase afterload** | **Increases MR, AR, VSD murmurs**  Decreases HOCM murmur  Later MVP click |
| **Valsalva**  **Standing up** | **Decrease preload** | Decreases most murmur intensities  **Increases HOCM murmur**  **Earlier MVP click** |
| **Rapid squatting** | **Increase venous return**  **Increase preload**  **Increase afterload** | Decreases HOCM murmur  **Increases AS murmur**  Later MVP click |

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| **Heart murmurs** | | | |
| **Systolic** | **Aortic**  **Stenosis** | **Cresendo-decrescendo systolic murmur**  **Radiates to carotids**  Weak and delayed pulses  (pulsus parvus et tardus)  **Syncope** (dec flow to brain)  **Angina** (dec flow to heart)  **Dyspnea** (backup flow) | **Williams syndrome** (supravalvular)  **Calcification** w/ age  **Early calcification of bicuspid**  **Pulm. Stenosis: rubella** |
| **Mitral/Tricuspid**  **Regurgitation** | **Holosystolic blowing systolic murmur**  **Mitral: loudest at apex, axilla radiation**  **Tricuspid: radiates to right sternal border** | **Rheumatic fever (early)**  **Endocarditis**  Mitral: ischemic heart disease, MVP,  LV dilatation  Tricuspid: RV dilatation |
| **Mitral Valve**  **Prolapse** | **Late systolic crescendo murmur**  **Midsystolic click** (tensed chordae)  **Apex**, loudest before S2 | **Myxomatous degeneration**  (Marfan, Ehlers Danlos)  **Rheumatic fever**  **Chordae rupture** |
| **Ventricular**  **Septal Defect** | **Holosystolic, harsh murmur**  **Loudest in tricuspid area**  Leads to **Eisenmenger** syndrome |  |
| **Diastolic** | **Aortic**  **Regurgitation** | **Blocking decrescendo diastolic murmur**  **Hyperdynamic pulse, head bobbing**  Wide pulse pressure | **Marfan syndrome**  Aortic root dilation  **Bicuspid aortic valve**  **Endocarditis, rheumatic fever**  **Causes left HF** |
| **Mitral**  **Stenosis** | **Late diastolic rumbling murmur**  **Opening snap** (leaflets halt motion)  **Decr. between S2/OS means more severe** | **Rheumatic fever (late)**  Causes LA dilatation |
| **Patent Ductus**  **Arteriosus** | | **Continuous machine-like murmur**  Listen at **left infraclavicular area**  Loudest at S2 | **Congenital rubella**  Prematurity  **Treat with indomethacin** |