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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 murmurLater 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 dilatationTricuspid: 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** |