KOMPLEXNÍ KARDIO VASKULÁRNÍ CENTRUM VFN Praha

Examination of thorax III

- valvular diseases

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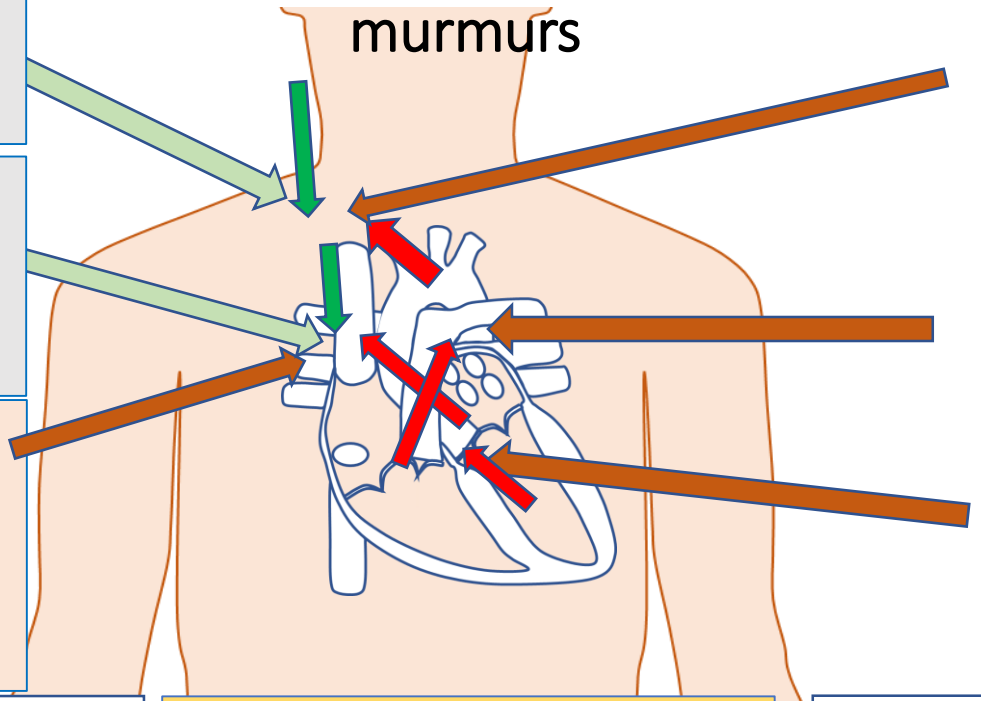
Innocent systolic and continusous murmurs

Cervical venous hum (continuous)
- Faster flor from ***jugulary veins***
- *Right supraclavicular region* (louder in diastole)
- Disappears after compression

Mammary souffle (continuous)
- *2nd right intercostal space*
- ***Mammary artery (pregnancy)***
- **Begins after S1!, louder in systole**

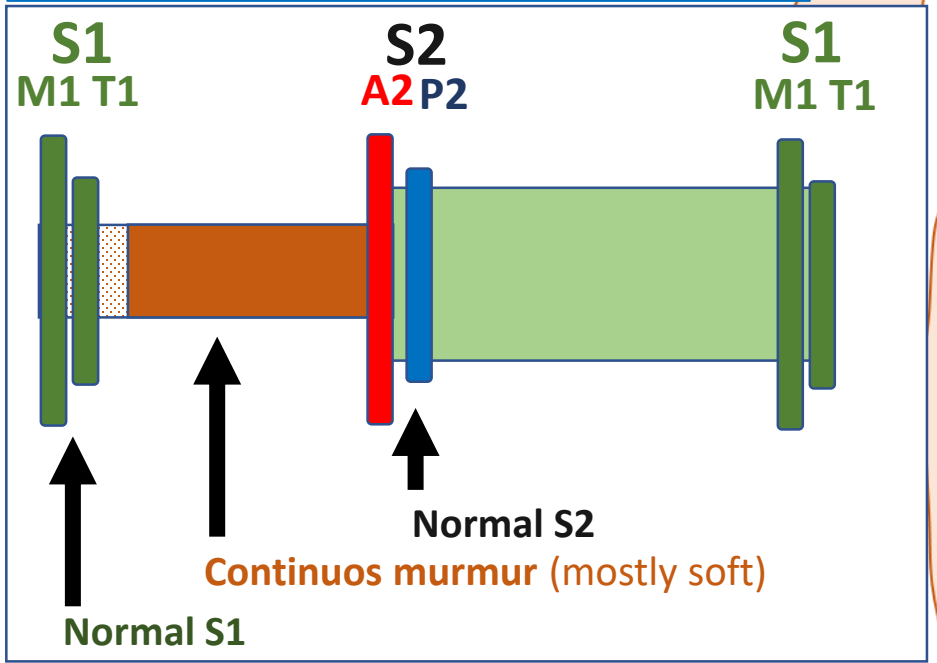
Innocent aortic ejection murmur
„Athlete´s murmur“
- *2nd right intercostal space*
- Faster flow accros ***aortic valve***
- Frequently associated with physiologic S3



Supraklavicular systolic (ejection) murmur
- Right supraclavicular region
- Turbulent flow in ***truncus brachiocephalicus***

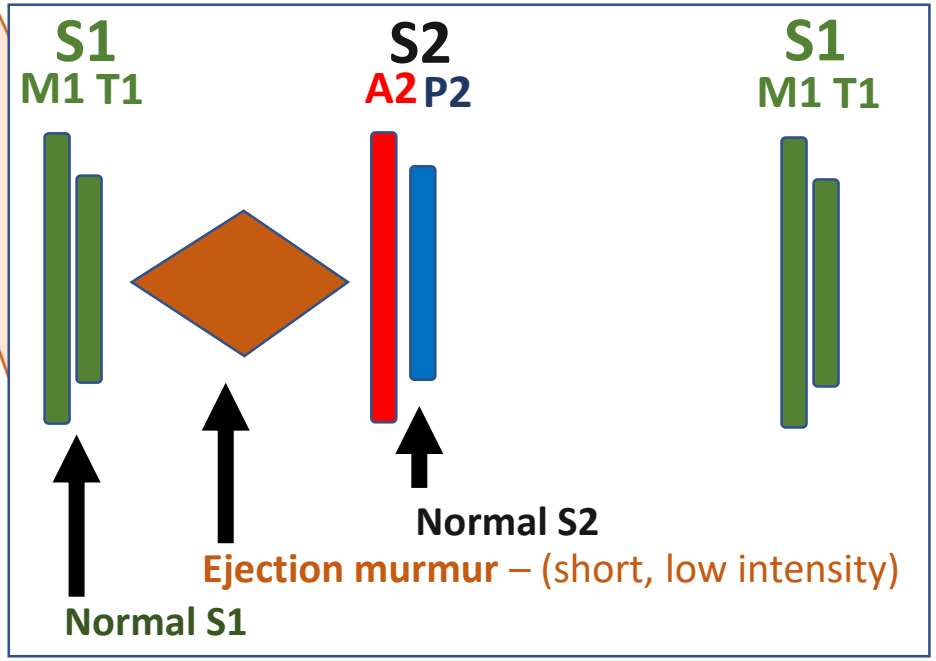
Physiological pulmonary ejection murmur
- 2nd left intercostal space
- Turbulent flow in ***pulmonary artery***

Still´s vibratory systolic murmur
- (***ejection***, in Erb´s point)
- Turbulent flow in ***LVOT***



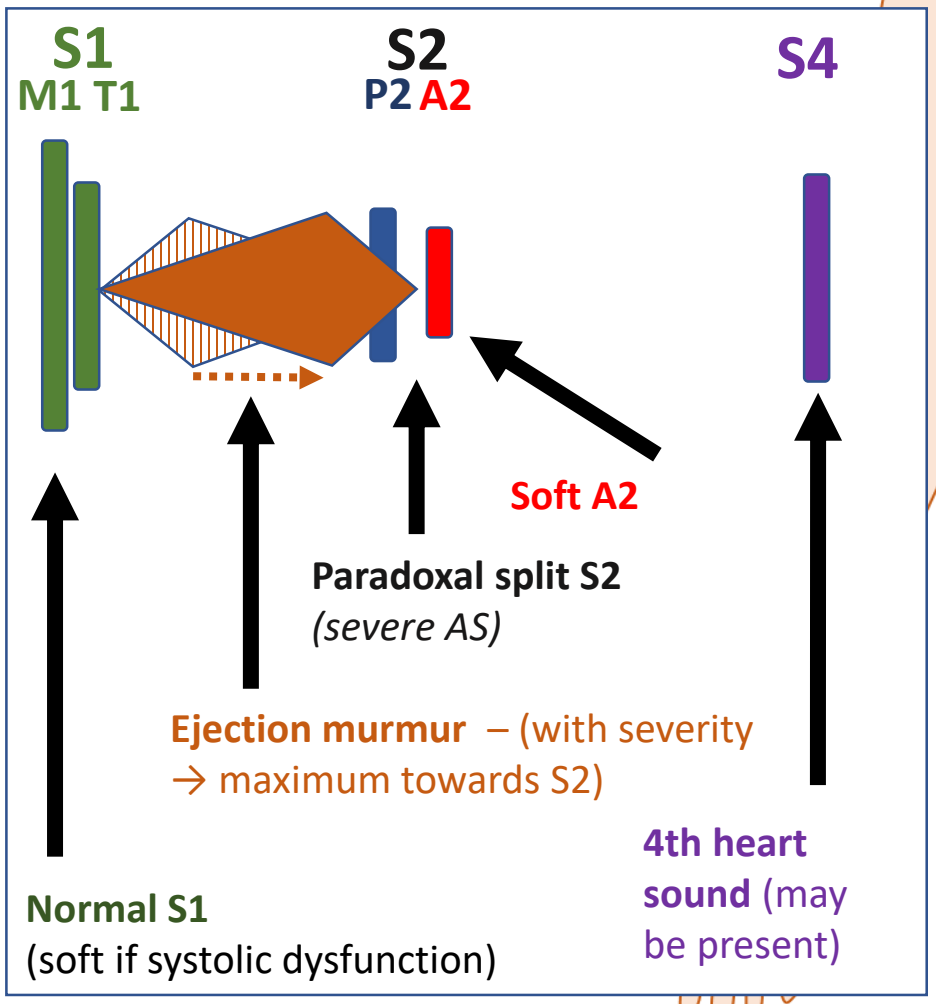
- **No other pathological physical exam findings**

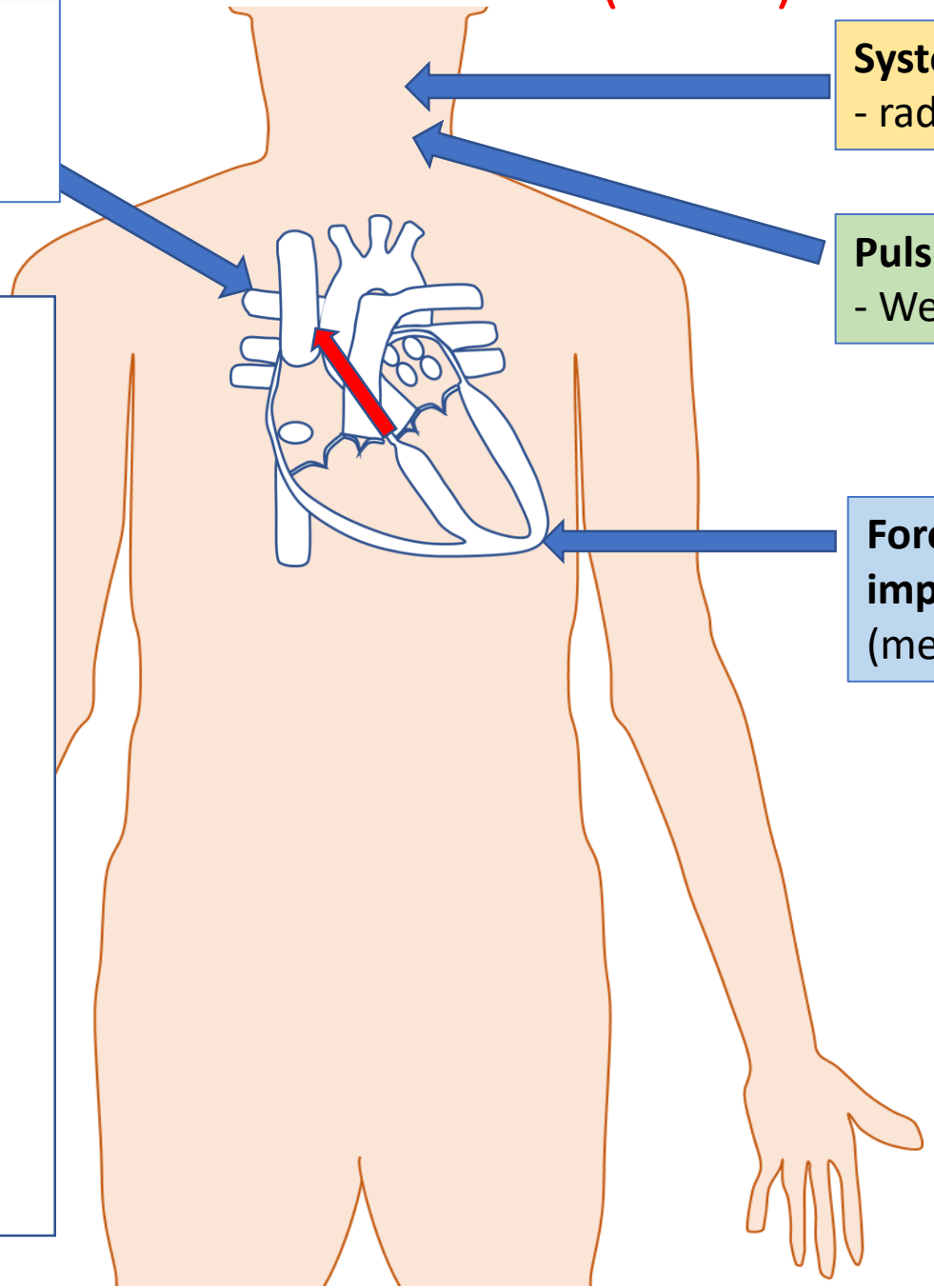
- **Children**
- **Still´s (ejection)**
- **Supraclavicular (ejection)**
- **Pulmonary (ejection)**
- **Cervical venous hum (contin.)**
- **Athletes (exercise, anemia…)**
- **Aortic (ejection)**
- **Pregnancy**
- **Mammary souffle (contin.)**



Aortic stenosis (severe)

Systolic (ejection) murmur
- 2. right intercostal space
- diamond shape configuration of murmur





Systolic murmur above carotid aa.
- radiation from aorta

Pulsus parvus et tardus
- Weak and delayd pulse

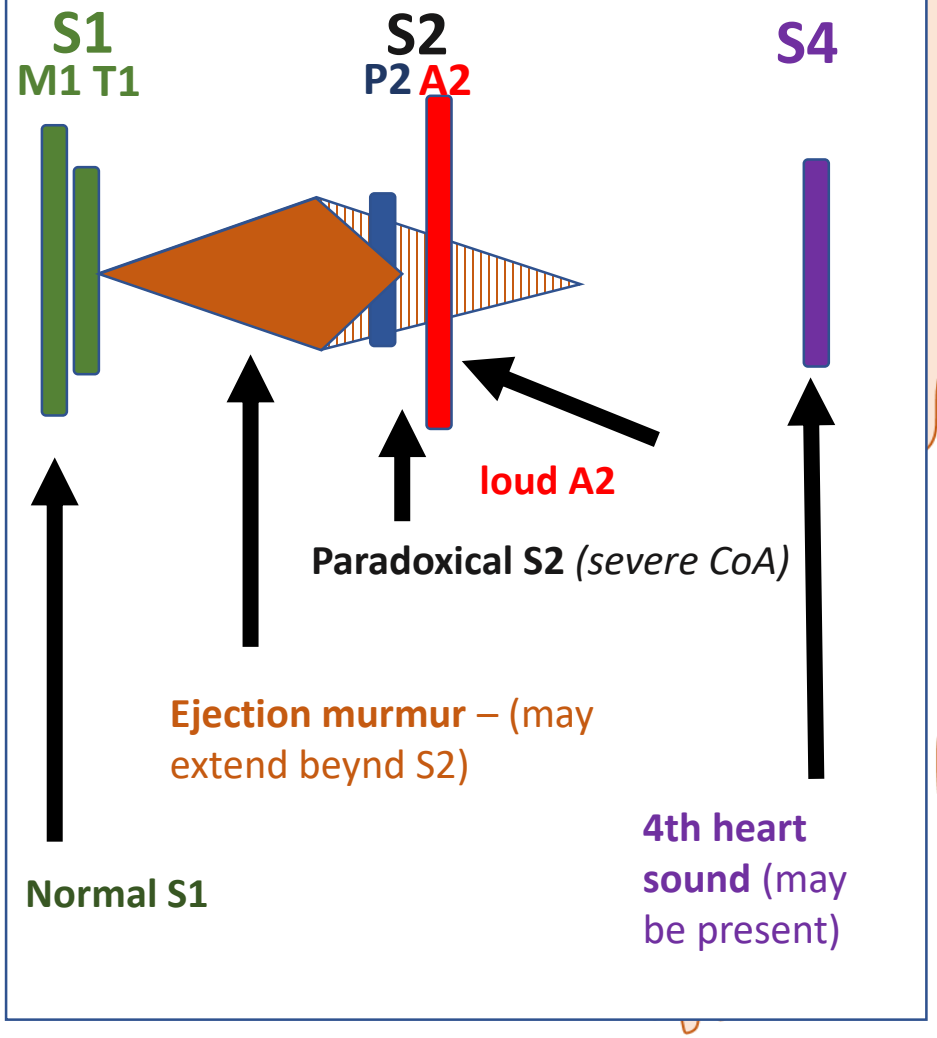
Forceful + not displaced apical impulse
(medially from midclavicular)

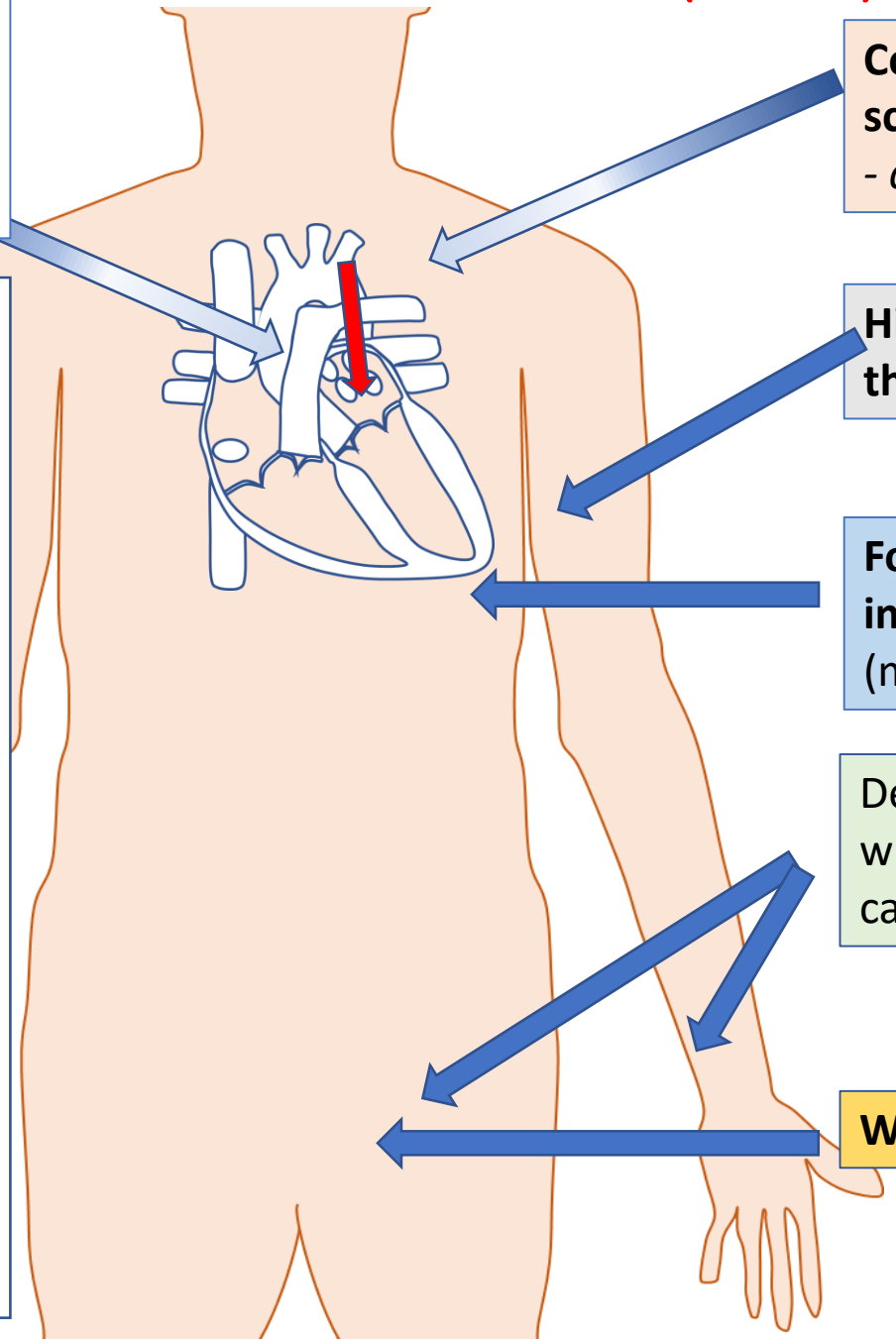
Coarctation of aorta (severe)

Systolic (ejection) murmur

- between scapulas

- may extend beyond S2 if the diastolic pressure is high





Continous murmur above scapulas

- caused by collaterals

Higher blood pressure in armes than legs

Forceful + not displaced apical impulse

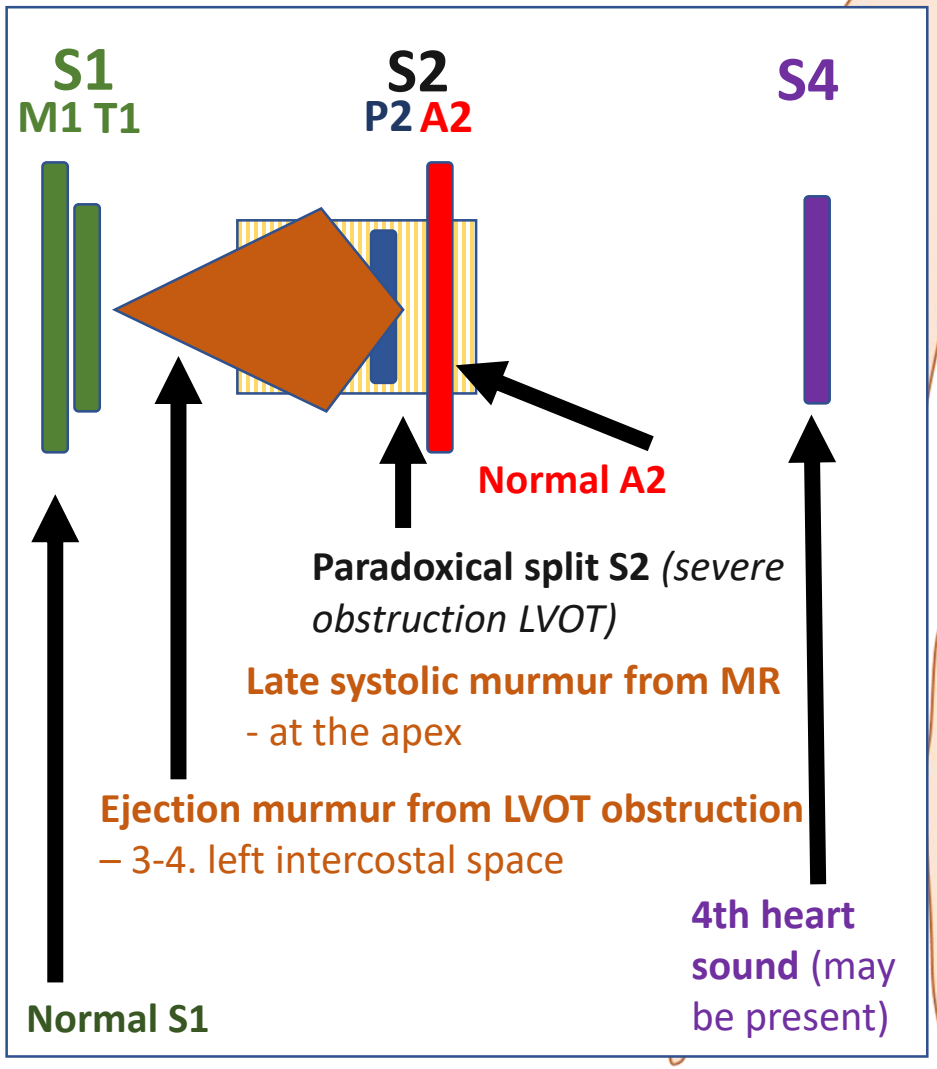
(medially from midclavicular)

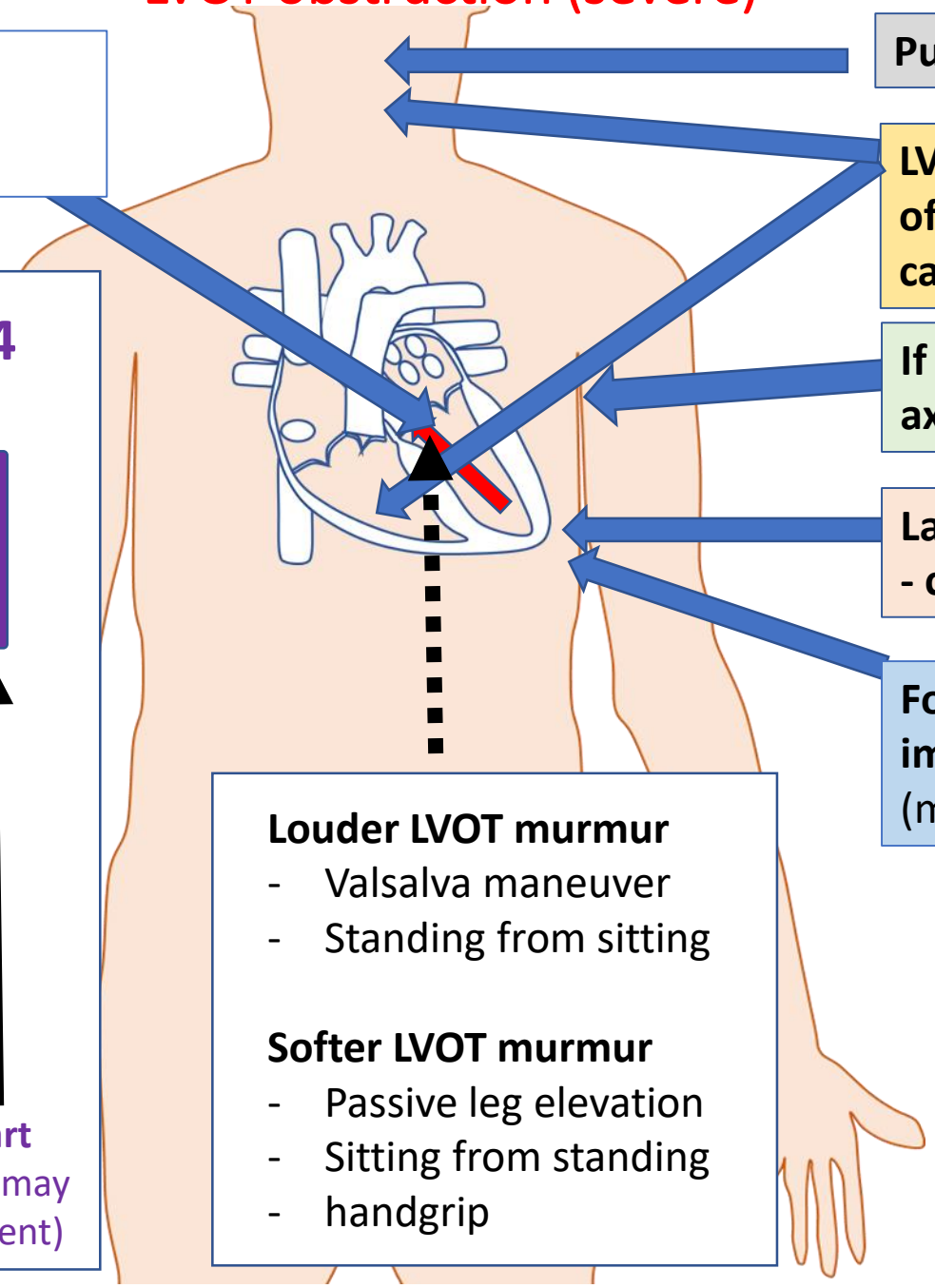
Dealyed pulse of femoral arteries when compared to femoral or carotid aa.

Weak pulse of femoral arteries

LVOT obstruction (severe)

Ejection systolic murmur
- 3.- 4. left intercostal space





Pulsus bisferiens

LVOT murmur radiation to basis of the heart and weakly to carotid aa.

If MR → murmur radiation to axilla

Late systolic murmur
- caused by MR

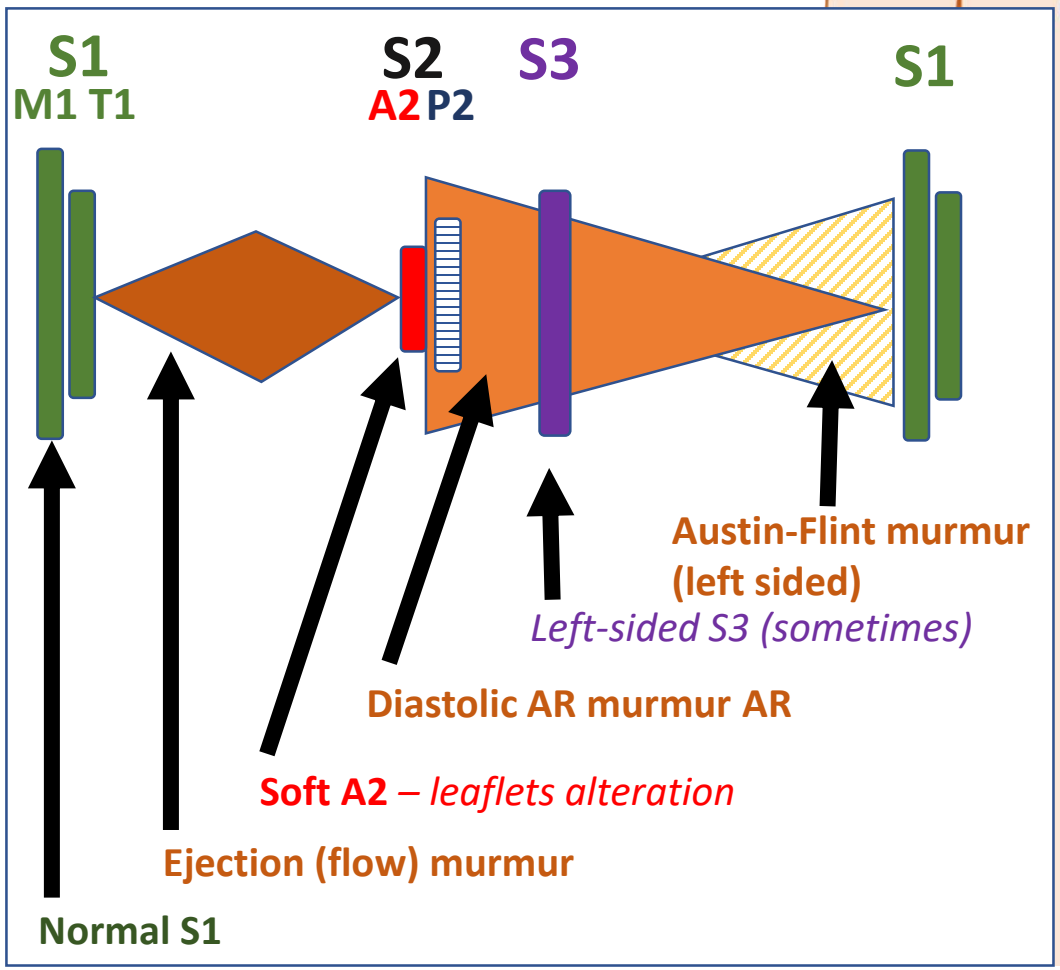
Forceful + not displaced apical impulse
(medially from midclavicular)

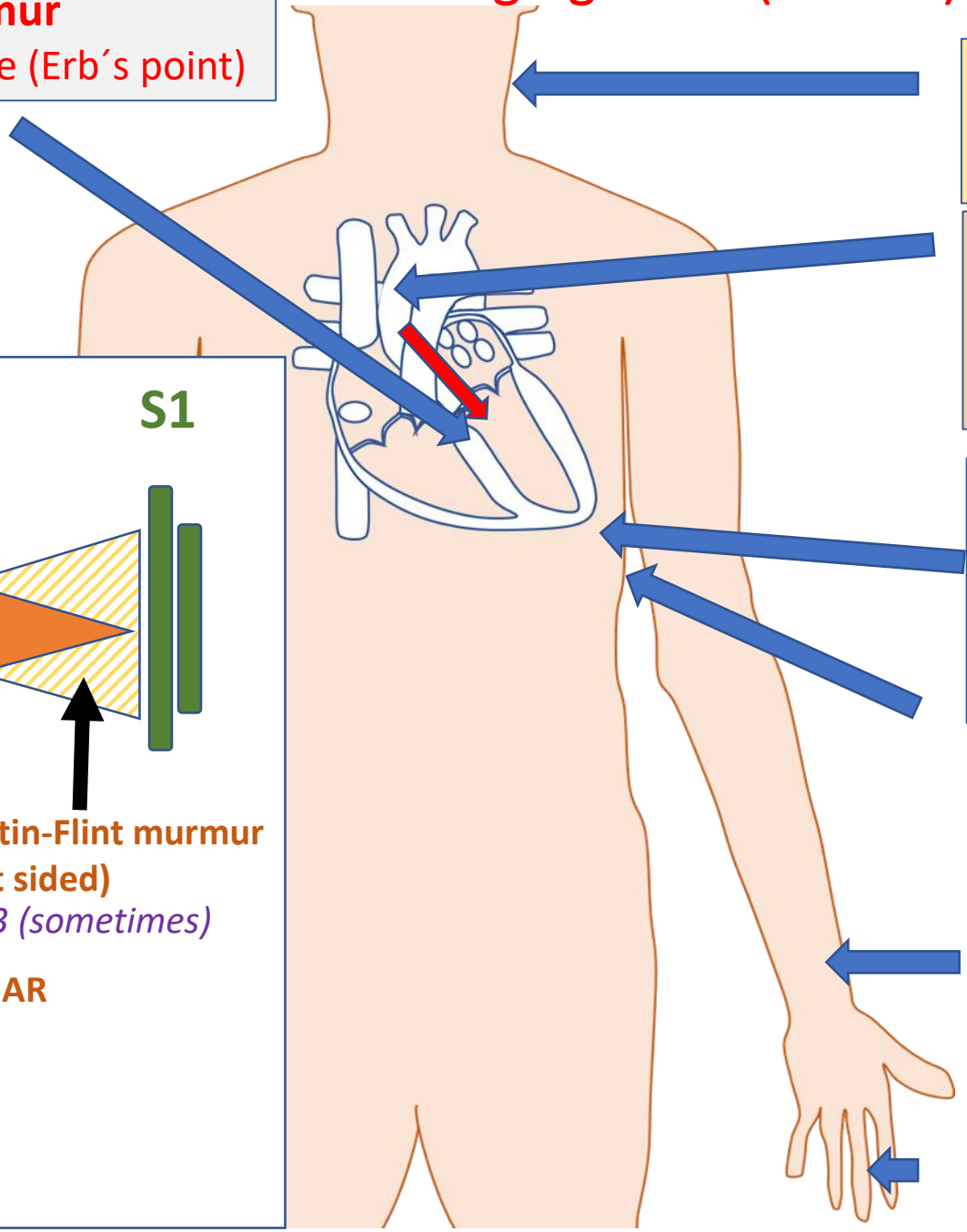
Louder LVOT murmur
- Valsalva maneuver
- Standing from sitting

Softer LVOT murmur
- Passive leg elevation
- Sitting from standing
- handgrip

Aortic regurgitation (chronic)

Early diastolic decrescendo murmur
- maximum 3.- 4. left intercostal space (Erb´s point)





Systolic murmur at carotid aa.
(radiated from aorta due to ↑ stroke volume)

Ejection murmur
- *2nd right intercostal space*
- *↑ stroke volume,*
- *crescend-descendo*

Mid (late) diastolic crescendo murmur = Austin-Flint murmur
- *AR jet hitting mitral anterior leaflet*
- *at the apex*
- *No opening snap (DDx from MS)*

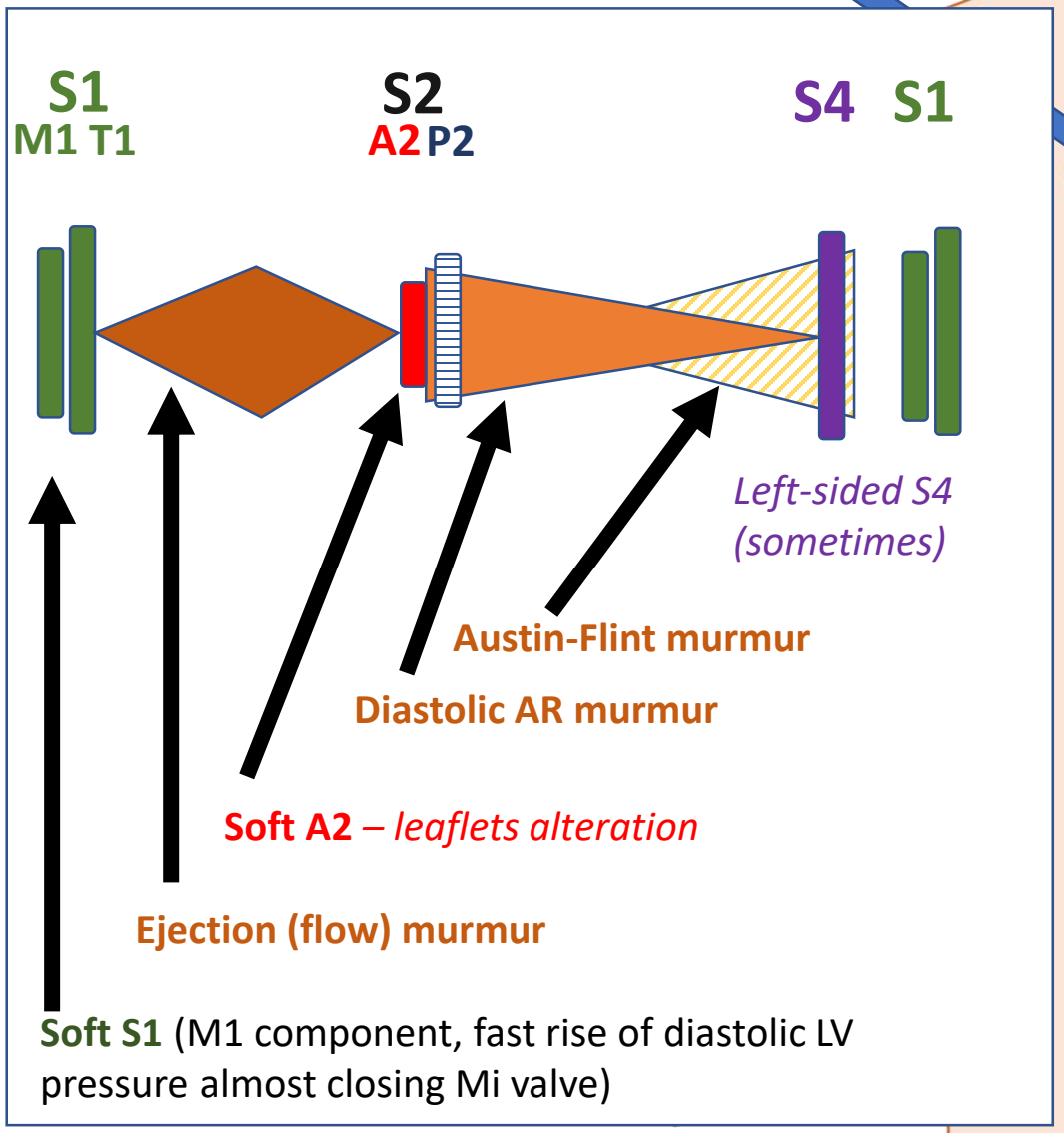
Forceful + displaced apical beat
- Laterally from midclavicular line
- 6th intercostal space

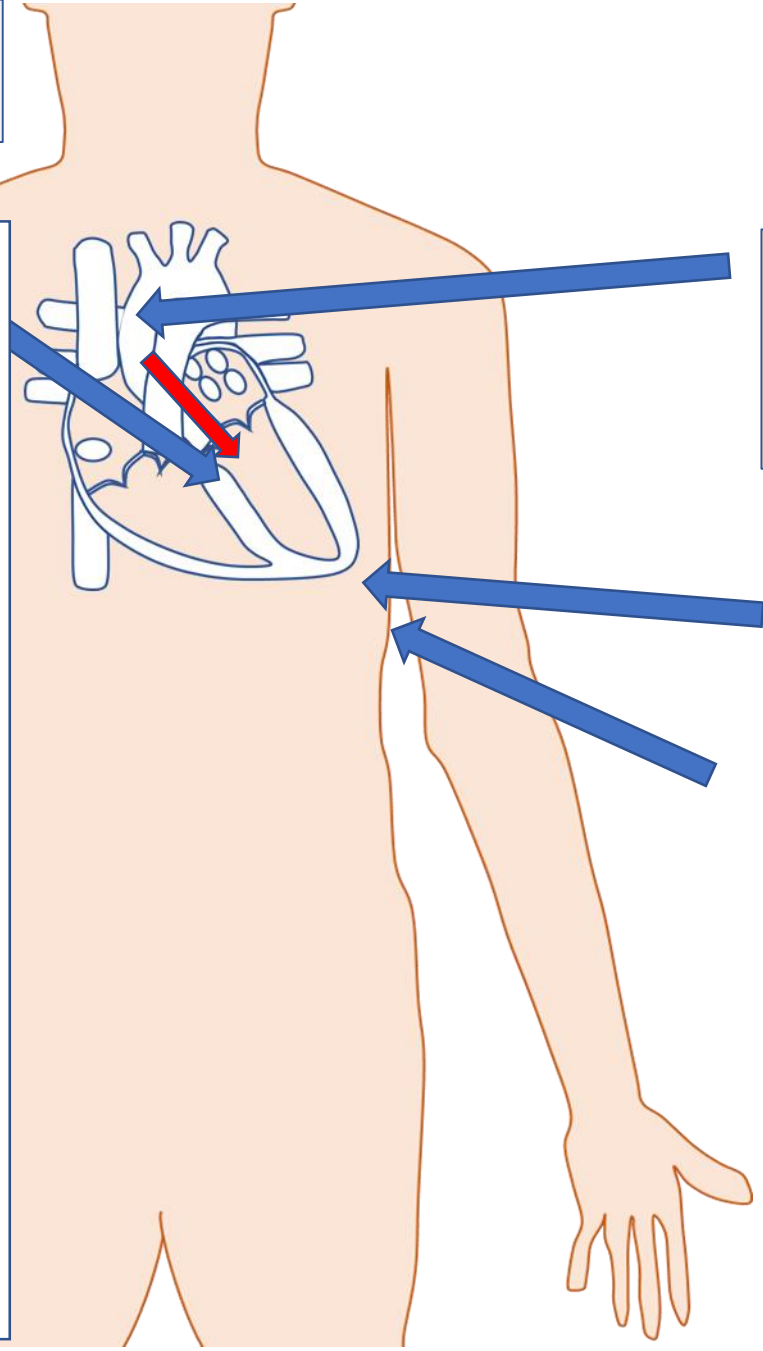
Pulsus magnus, celer et altus – Corrigan´s pulse
- fast, strong, rapidly collapsing

Quincke capillary pulsation

Aortic regurgitation (acute)

Early diastolic decrescendo murmur
- maximum 3.- 4. left intercostal space (Erb´s point)





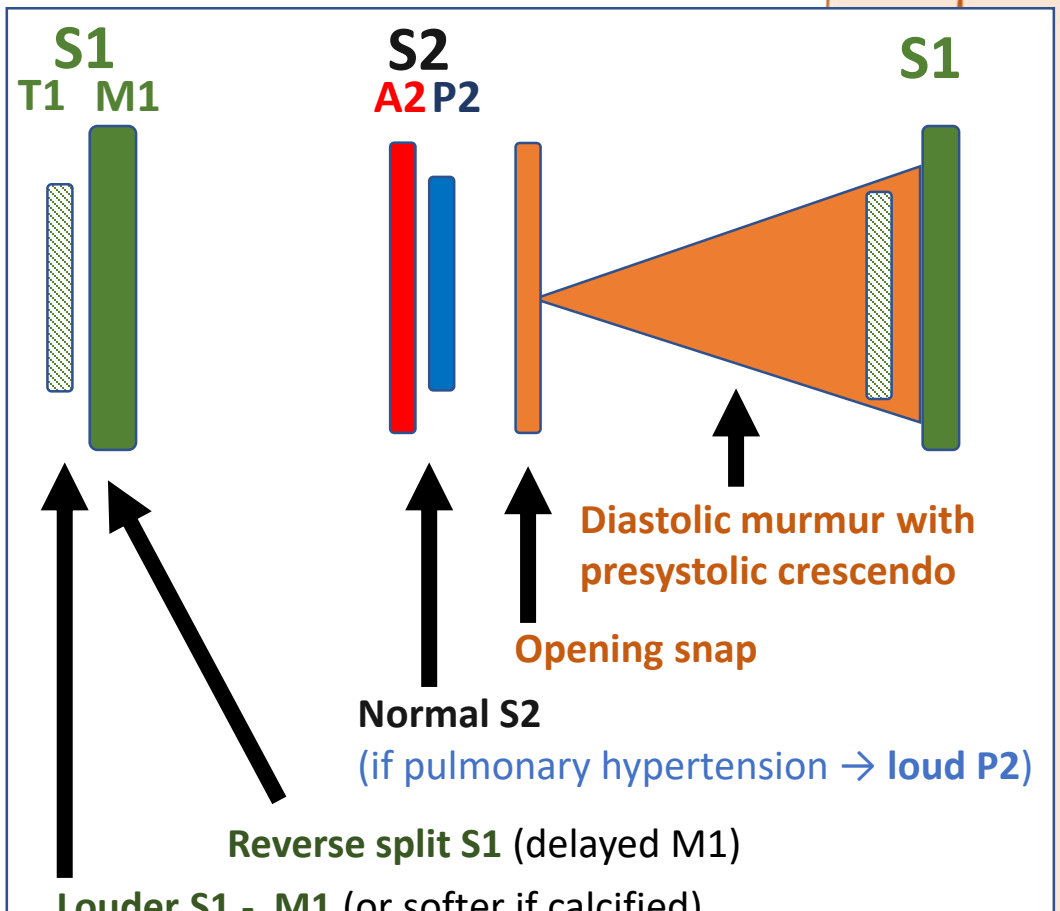
Ejection flow murmur
- *2nd right intercostal space*
- *↑ stroke volume,*
- *crescend-descendo*

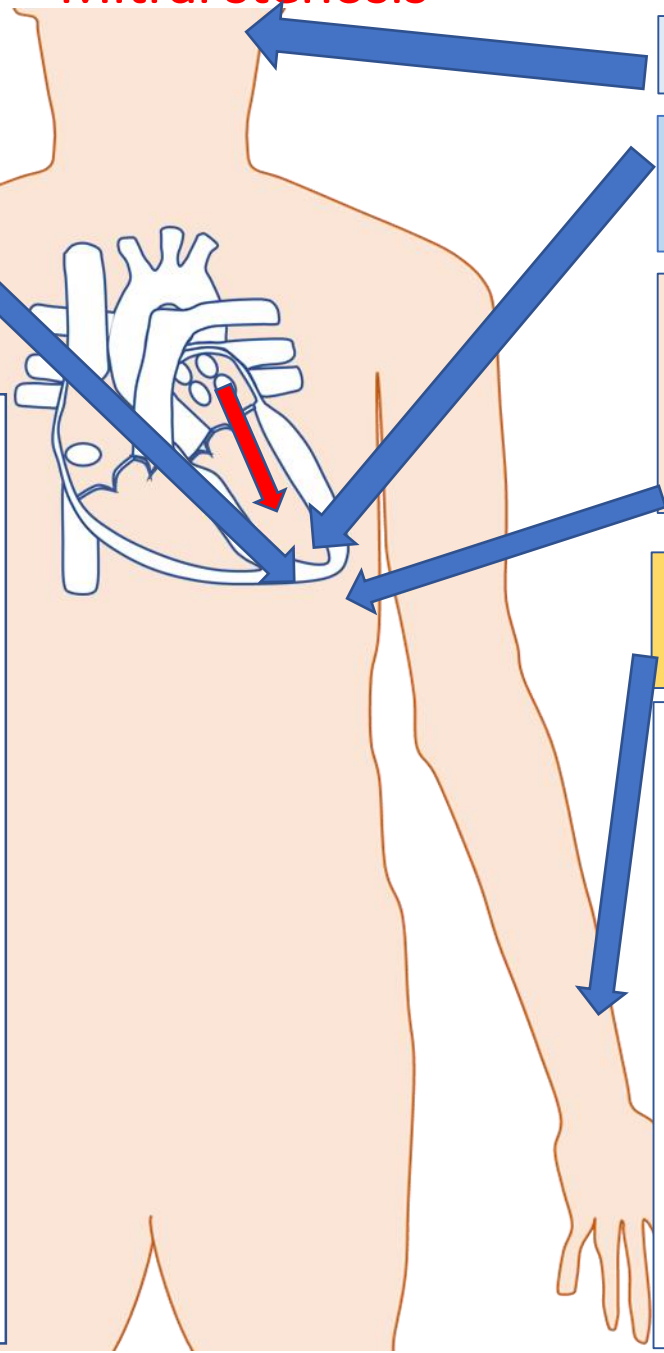
***Diastolic murmur** – apex*
= Austin-Flint murmur
- *AR jet hitting mitral anterior leaflet*
- *crescendo, at the apex*
- *No opening snad (diffrence from MS)*

Not displaced apical beat,
even normal intesity possible!

Mitral stenosis

Diastolic murmur – at the apex
- *mezo to late diastolic,*
- *presystolic crescendo (if sinus rhythm)*
- *Low pitch, rumbling*





Facies mitralis

Not displaced apical beat, even normal intesity!

Opening snap (early diastolic click)
+ modification of diastolic murmur
- **Expiration - LOUDER**
- **Inspiration - SOFTER**

Normal arterial pulse puls
(may be also weak)

Possible other findings (right heart):
S4 not present
- generation of S4 requires moving leaflets)
Loud P2 - pulmonary hypertension
Graham-Steell diastolic murmur – PR
Right – sided S4– ↑right atrial systole
+ **presystolic jugular vein pulsation**
Left parasternal heave – hypertrophy and dilatation of RV
Systolic murmur due to TR
+ systolic jugular vein pulsation
Right sided heart failure

Mitral regurgitation - chronic

Pansystolic (holosystolic) murmur –

- at the apex best heard in left lateral decubitus position position in expiration,

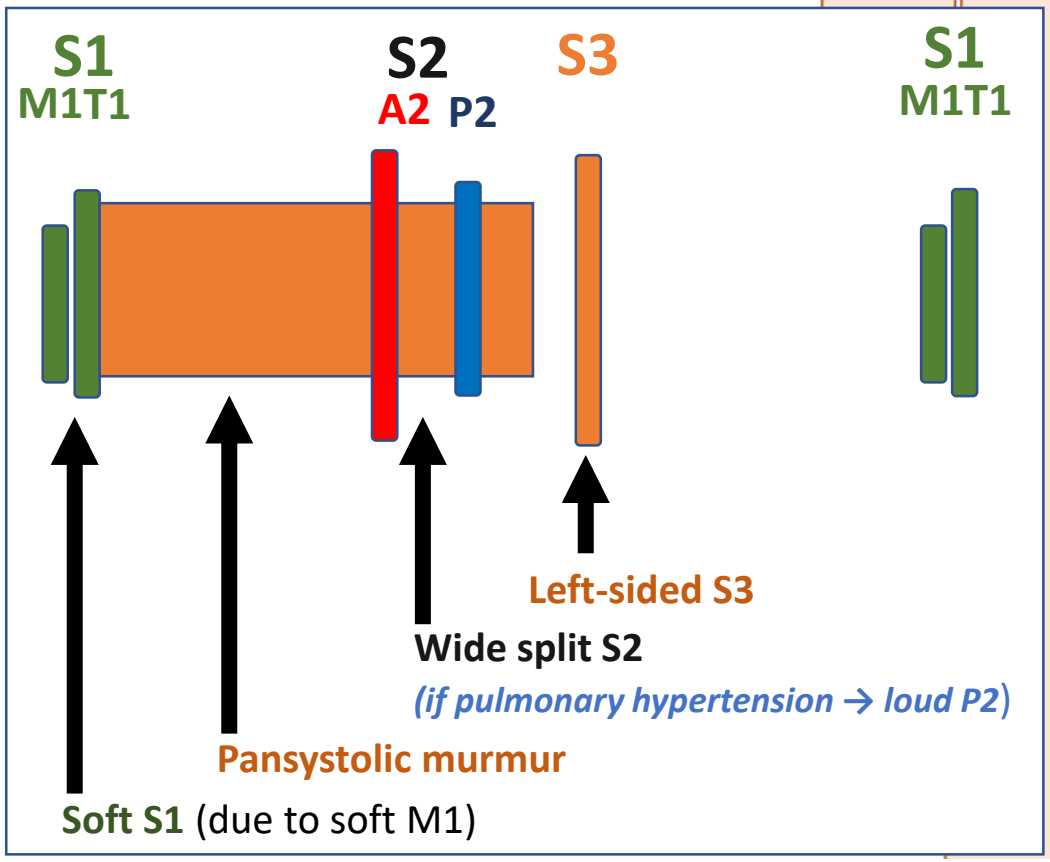
*- **Rectangular (plateau) shape** , blowing, high-pitched*

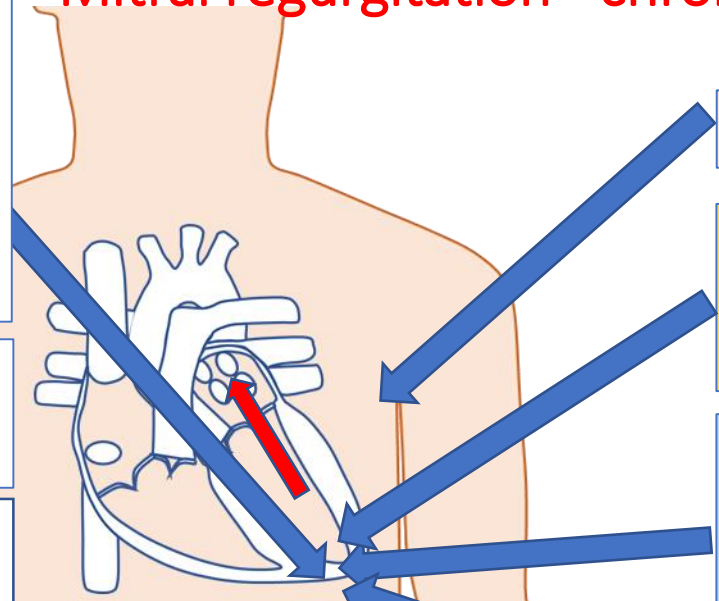
*: (**DDx → ejection murmurs – diamond shape**)*

*- no significant resiratory variation (**DDx → TR**)*

If prolaps → late systolic murmur

*- **mid systolic click** (murmur after the click)*





Murmur radiation to axilla

Left-sided S3
- Severe MR
- systolic LV dysfunction)

Forceful (hyperdynamic) + displaced apical beat
- Laterally from midclavicular line
- 6th intercostal space

Palpable thrill at the apex

↑ afterload → Louder murmur
- Handgrip
- *(Stand to squat)*

↓ afterload → Softer murmur
- Valsalva
- *(squat to stand)*

Possible other findings :

Diastolic flow murmur - short rumbling, sometimes present, due to ↑ flow across the valve

Left parasternal heave – caused by expanding left atrium in severe MR

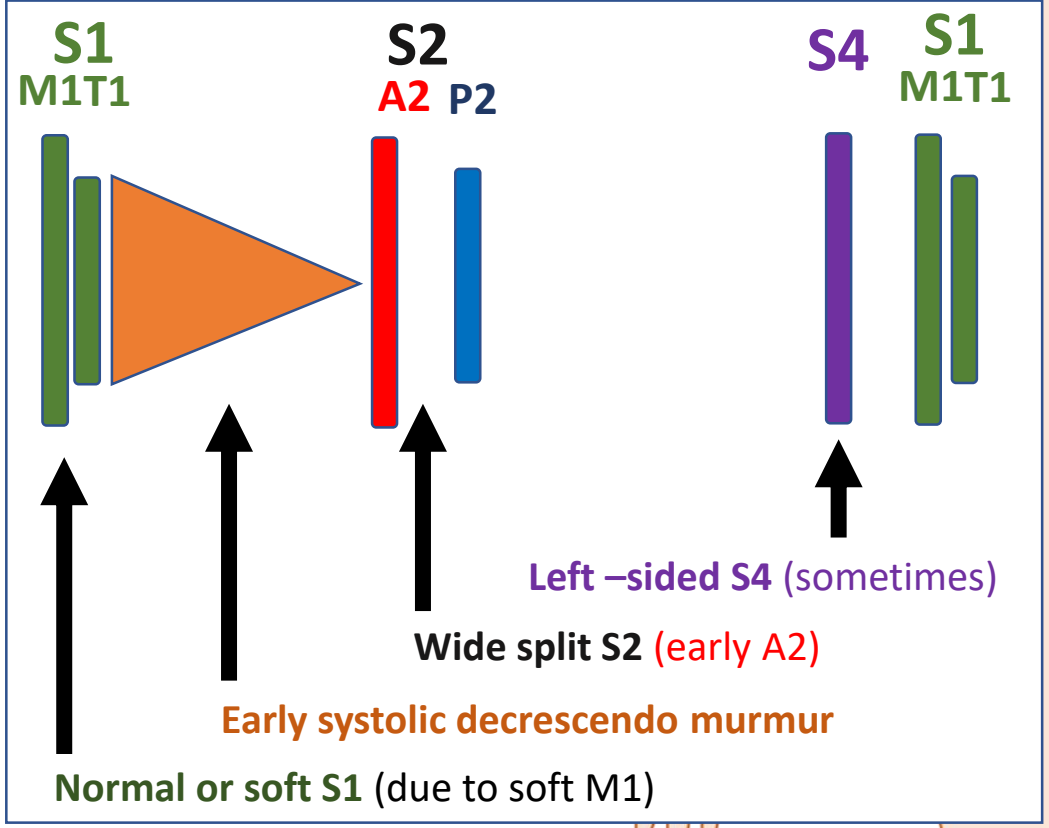
Signs of pulmonary hypertension
– with severity progression

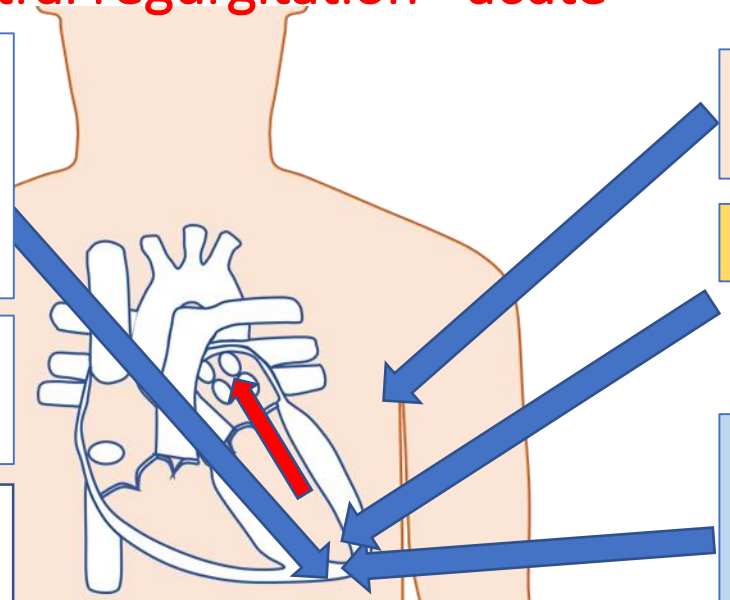
Signs of right sided HF
– with further severity progression

Mitral regurgitation - acute

Early systolic murmur (decrescendo) –
- best heard at the apex in left lateral decubitus position position in expiration,
- no significant resiratory variation

If prolaps → late systolic murmur
*- **mid systolic click** (murmur after the click)*





Murmur radiation to axilla
- or to back – depends on jet direction)

Left-sided S4

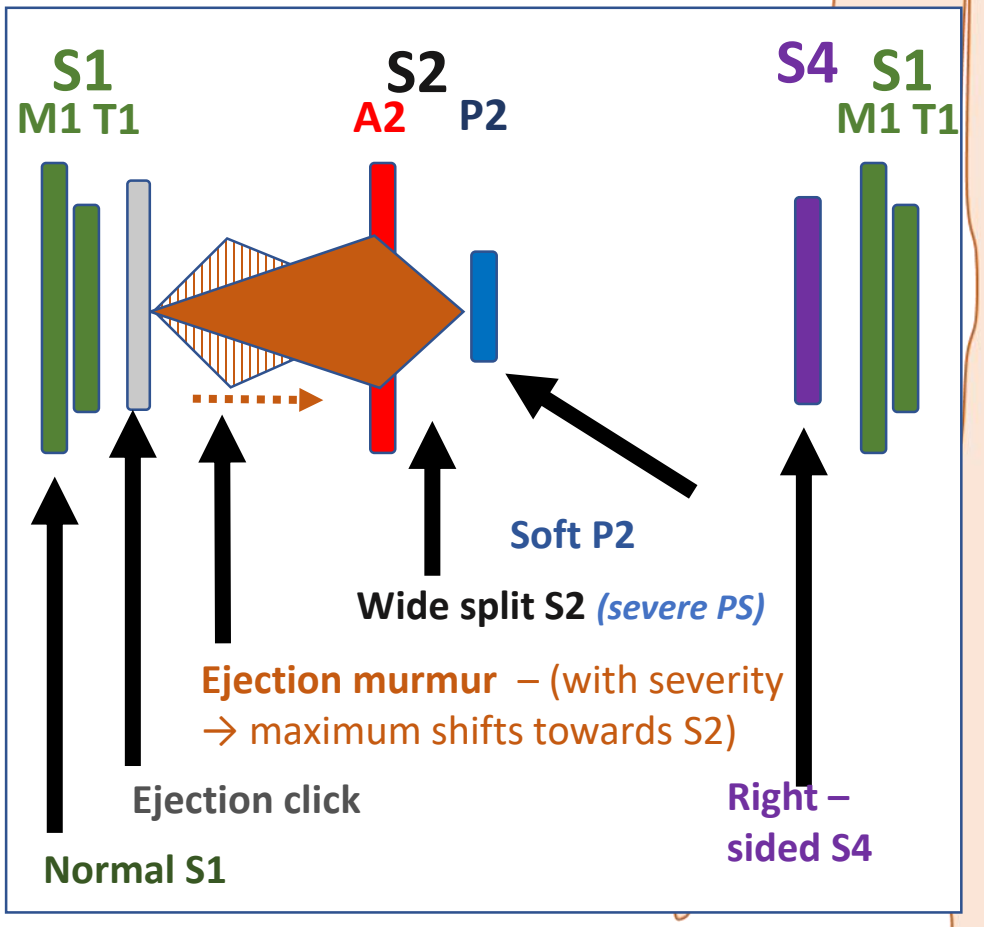
Forceful (hyperdynamic)
+ not displaced apical beat
- medially from midclavicular line
- 5th intercostal space

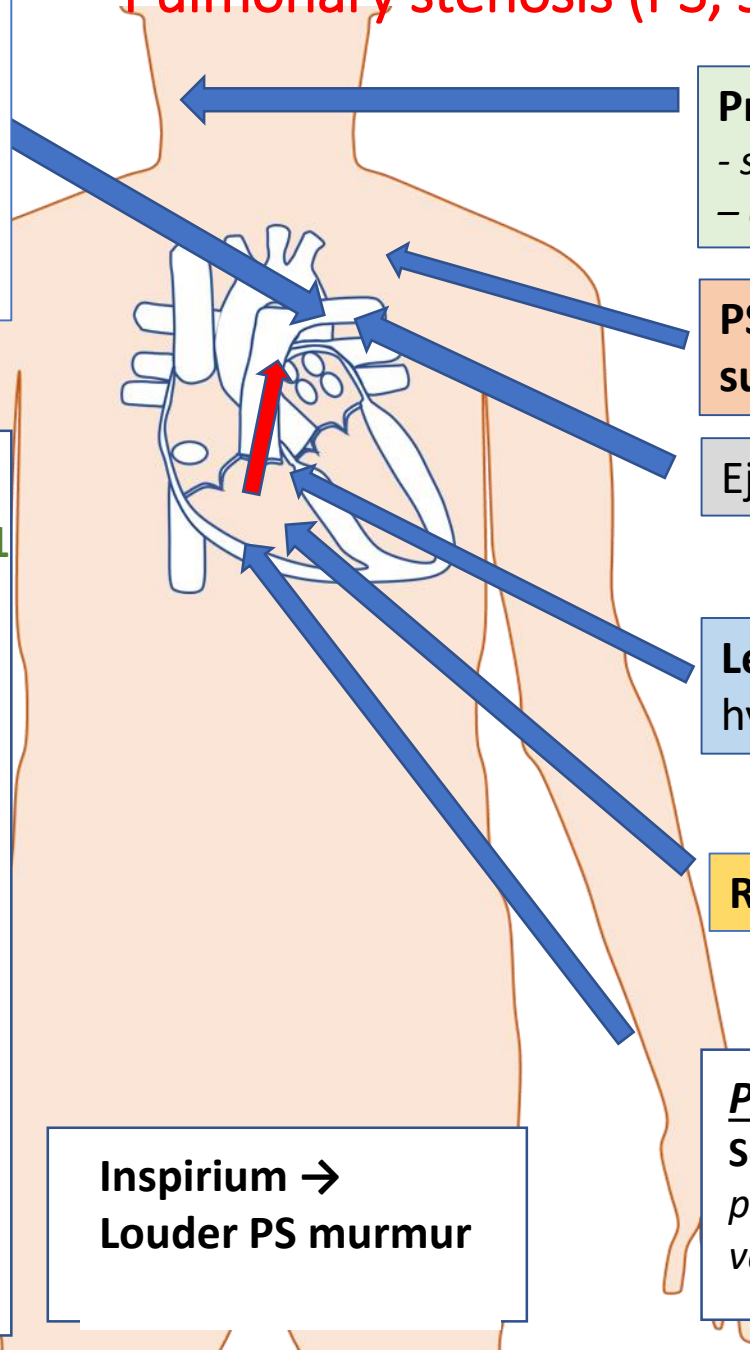
Possible other findings :
Tachycardia
Left sided heart failure - rales…
Cardiogenic shock – suddenly severe MR

Pulmonary stenosis (PS; severe) - *rare*

Systolic (ejection) murmur

- 2. left intercostal space
- diamond shape configuration of murmur
- Louder in inspirium





Presystolic jugulary vein pulsation
- strong right atrial contraction – corresponding to S4)

PS Murmur radiation to subclavian region

Ejection click - sometimes

Left parasternal lift (heave) – hypertrophy and dilatation of RV

Right-sided S4

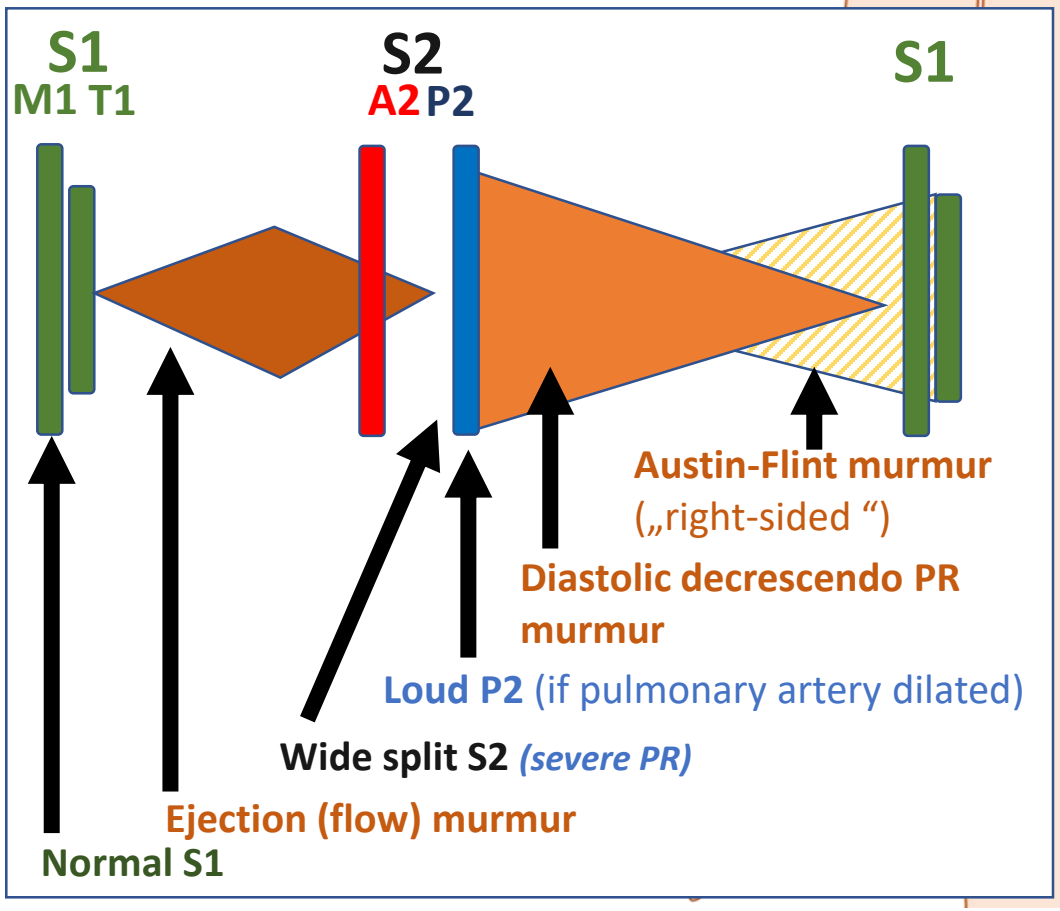
Inspirium → Louder PS murmur

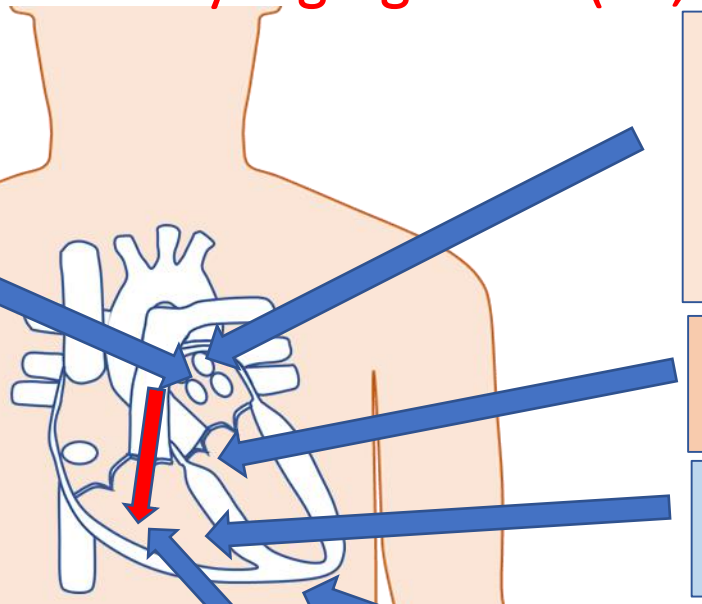
Possible other findings :
Secondary tricuspid regurgitation – *pansystolic murmur above tricuspid valve*

Pulmonary regurgitation (PR; severe) - rare

Early diastolic decrescendo murmur
- 2. left intercostal space
- High frequency blowing

If pulmonary hypertension present –
→**murmur named Graham-Steell**





Ejection flow murmur
- *2nd left intercostal space*
- *Possible radiation to subclavial regions*
- *due to ↑ Rv stroke volume*

PR murmur radiation to Erb´s pont

Left parasternal lift (heave) – hypertrophy and dilatation of RV

Mid (late) diastolic crescendo murmur = Austin-Flint murmur
- *at the base (left 4. intercostal space)*
- *PR jet hitting tricuspid anterior leaflet*
- *No opening snap (DDx from TS)*
- *No loud S1 (DDx from MS)*

Possible other findings :
Secondary tricuspid regurgitation
– pansystolic murmur above tricuspid valve (in advanced stage of PR)
Right-sided S3 or S4

Inspirium → Louder PR murmur
Valsalva → Softer PR murmur

Trikuspid regurgitation

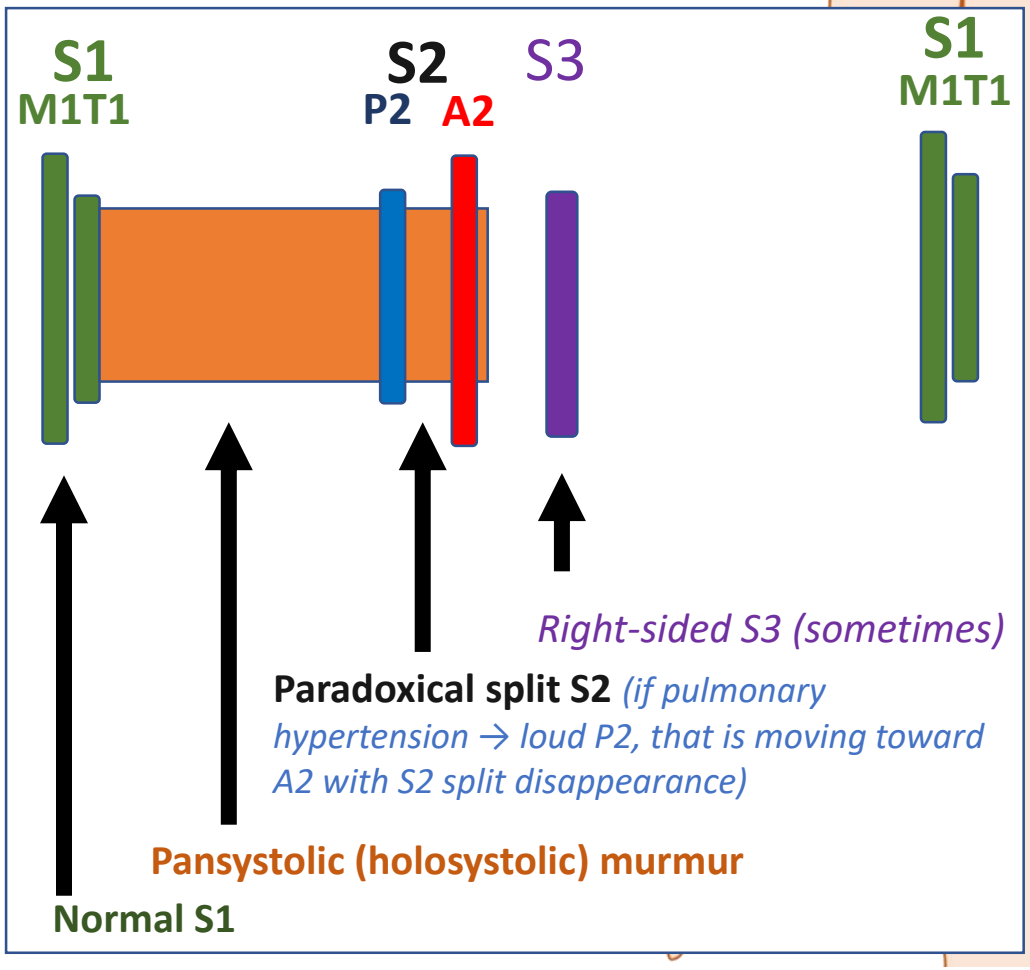
Pansystolic (holosystolic) murmur –

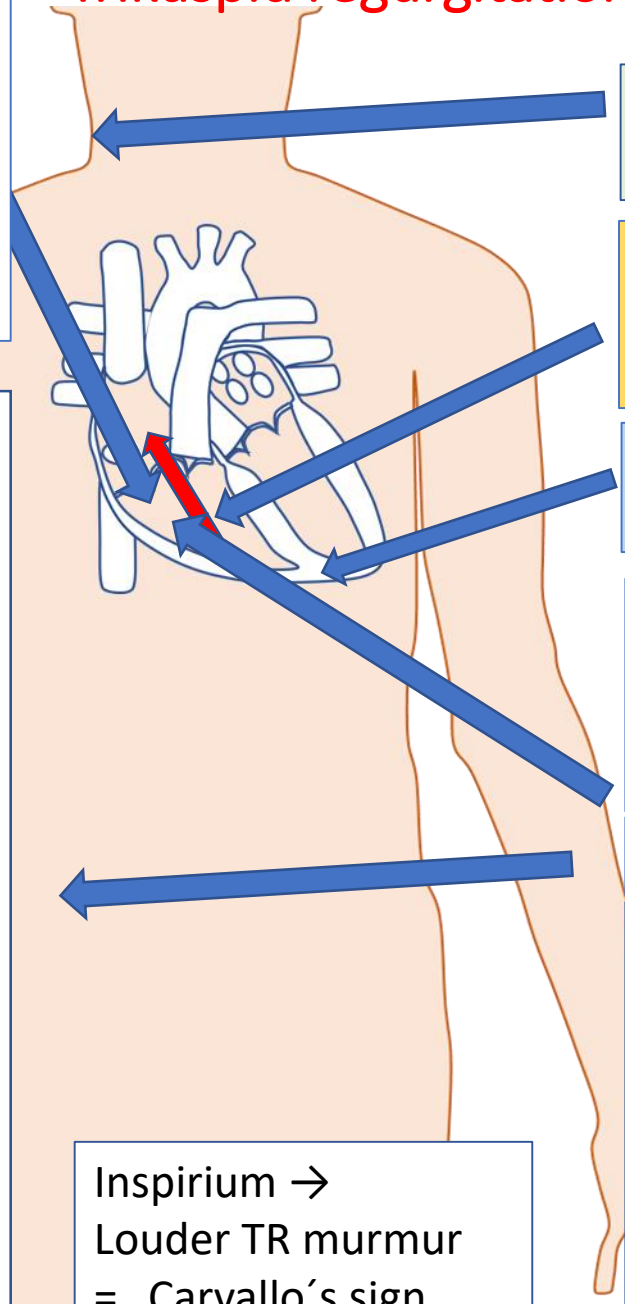
- left 4th intercostal spaxe next to sternum

*- **Rectangular (plateau) shape** (in severe TR may not be paradoxically very loud!),*

*: (**DDx → ejection murmurs – diamond shape**)*

*- significant resiratory variation (**DDx → MR**)*





Systolic jugular vein pulsation
+ distension

Right-sided S3 (variable)
- Severe TR with RV failure
- Louder with inspirium

Normal not displaced apical beat
- Shifts only with severe RV dilatation

Left parasternal heave
- due to dilated + hypertrophied RV
- Sometimes even right lift – due to expanding right atrium in severe TR

Pulsatile liver (systolic)

Possible other findings :

Diastolic flow murmur - over tricusp valve, sometimes present, due to ↑ flow across the valve

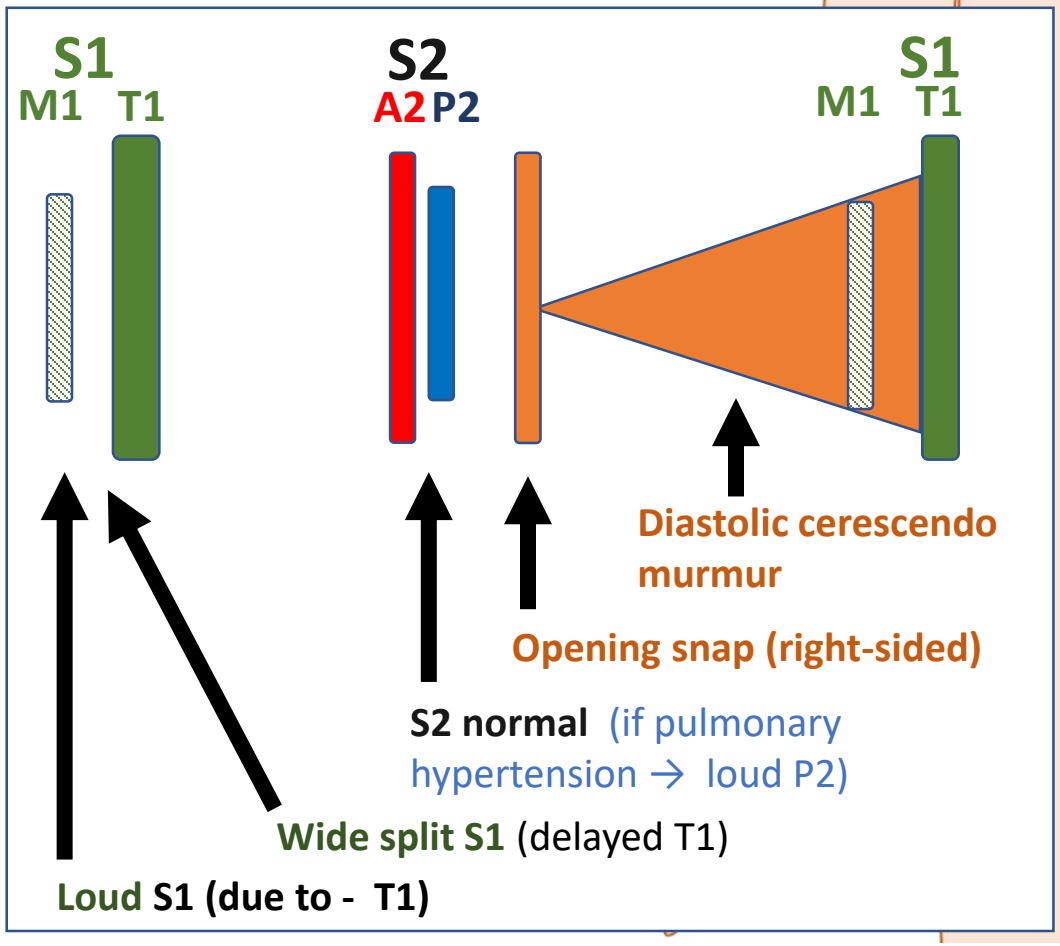
Signs of right sided HF

– with further progression of TR severity
- hepatomegaly, peripheral leg edema,, ascites, anasarca)

Inspirium →
Louder TR murmur
= „Carvallo´s sign

Trikuspid stenosis

Diastolic crescendo murmur
– 4th left intercostal space next to sternum
- meso to late diastolic,
- presystolic crescendo (if sinus rhythm)



Presystolic jugular vein pulsation + distension

Not displaced apical beat, even normal intensity

Opening snap (right -sided)
+ modification of TS diastolic murmur
- Expiration - SOFTER
- Inspiration - LOUDER

Pulsatile liver (presystolic)

Inspirium →
Louder TS murmur
= „Carvallo´s sign

Possible other findings :
Signs of right sided HF
– with further progression of TR severity
- hepatomegaly, peripheral leg edema, ascites, anasarca
S4 (right-sided) not present
- generation of S4 requires moving leaflets)