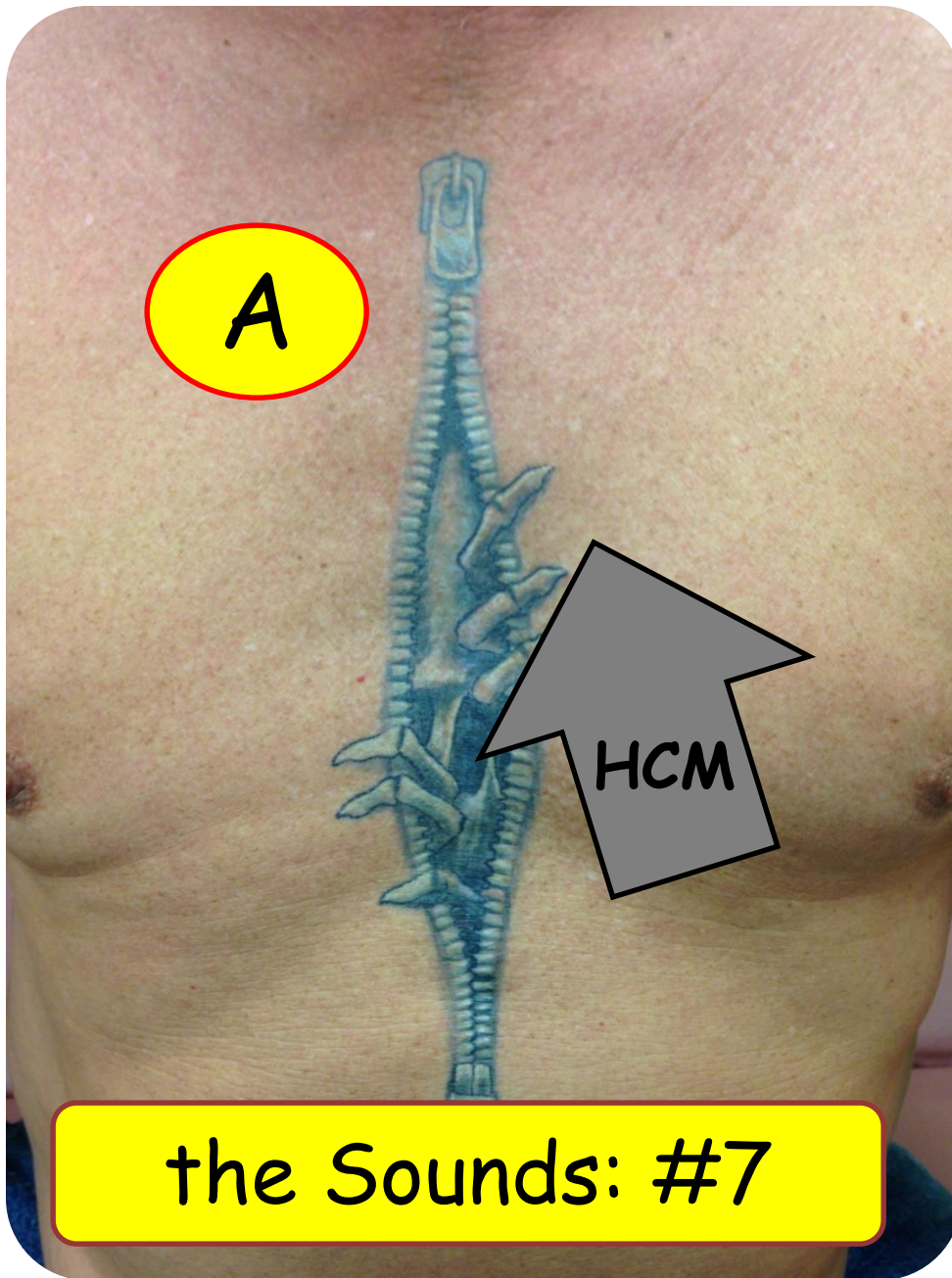


Cardiology



LV Outflow Obstruction:
Aortic Stenosis
(Coming Soon - HCM)

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the Sounds: #7

Aortic Valve Disorders

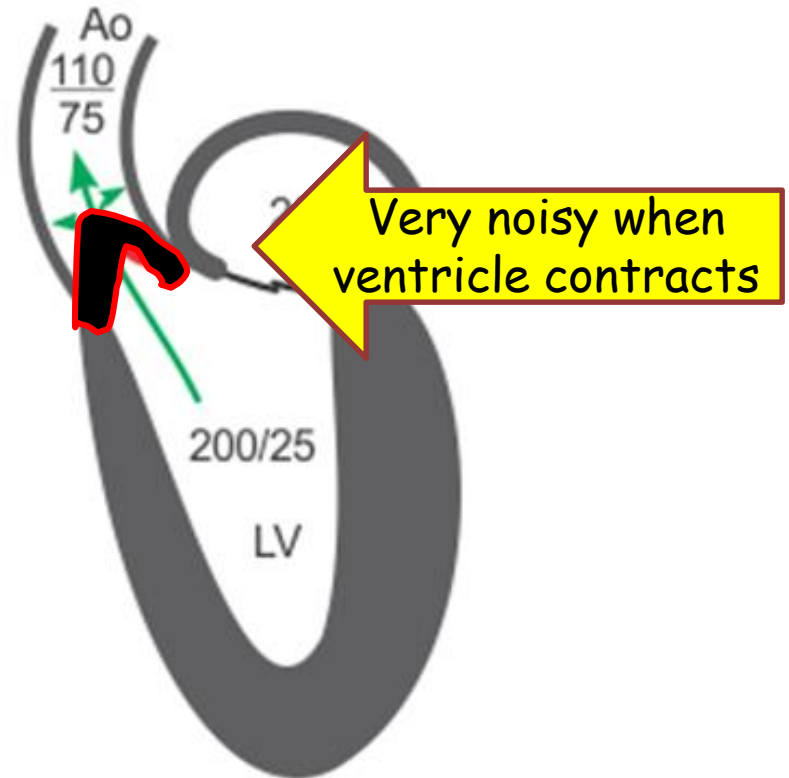
Stenosis

Regurgitation

Aortic Valve Disorders

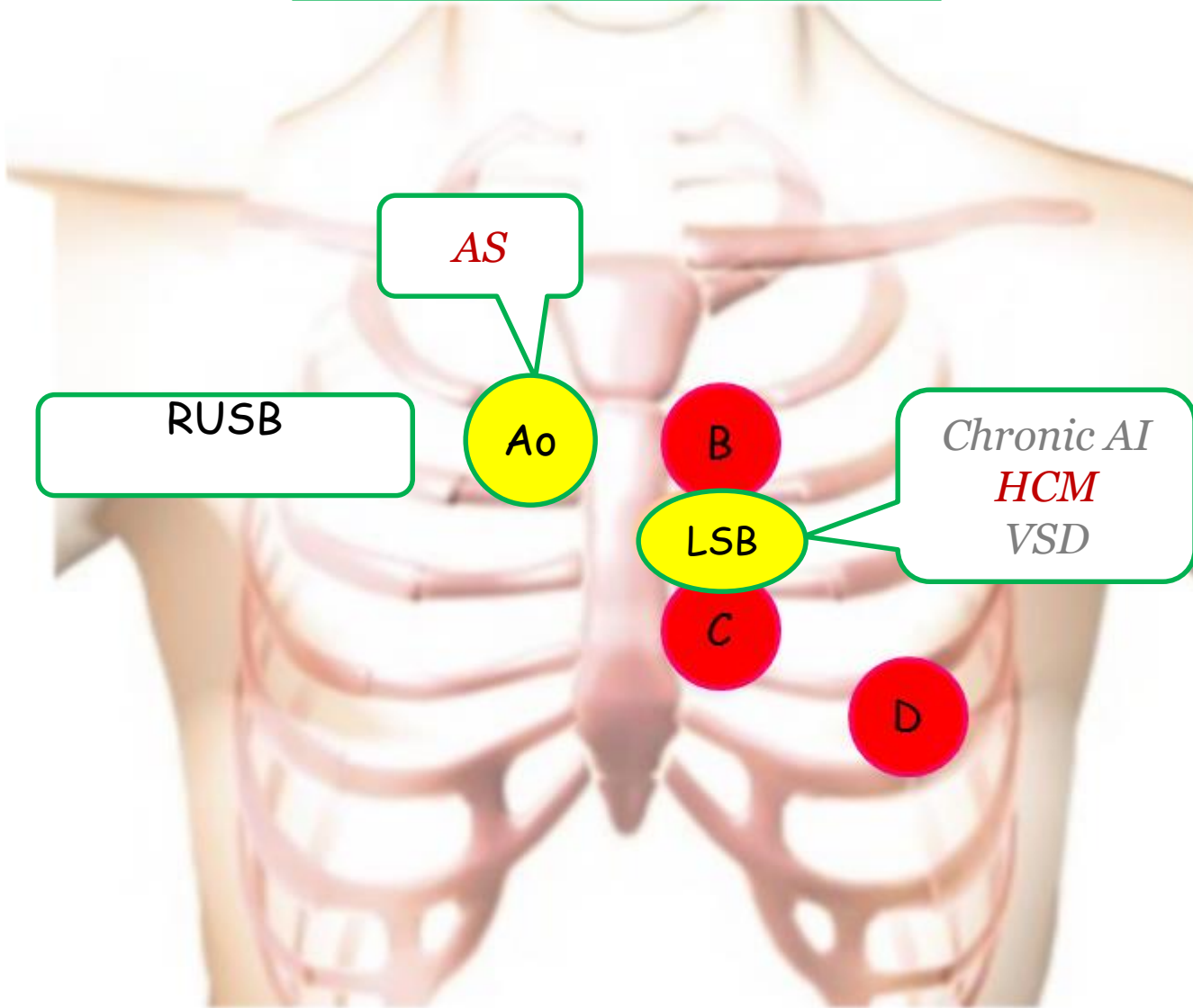
Stenosis

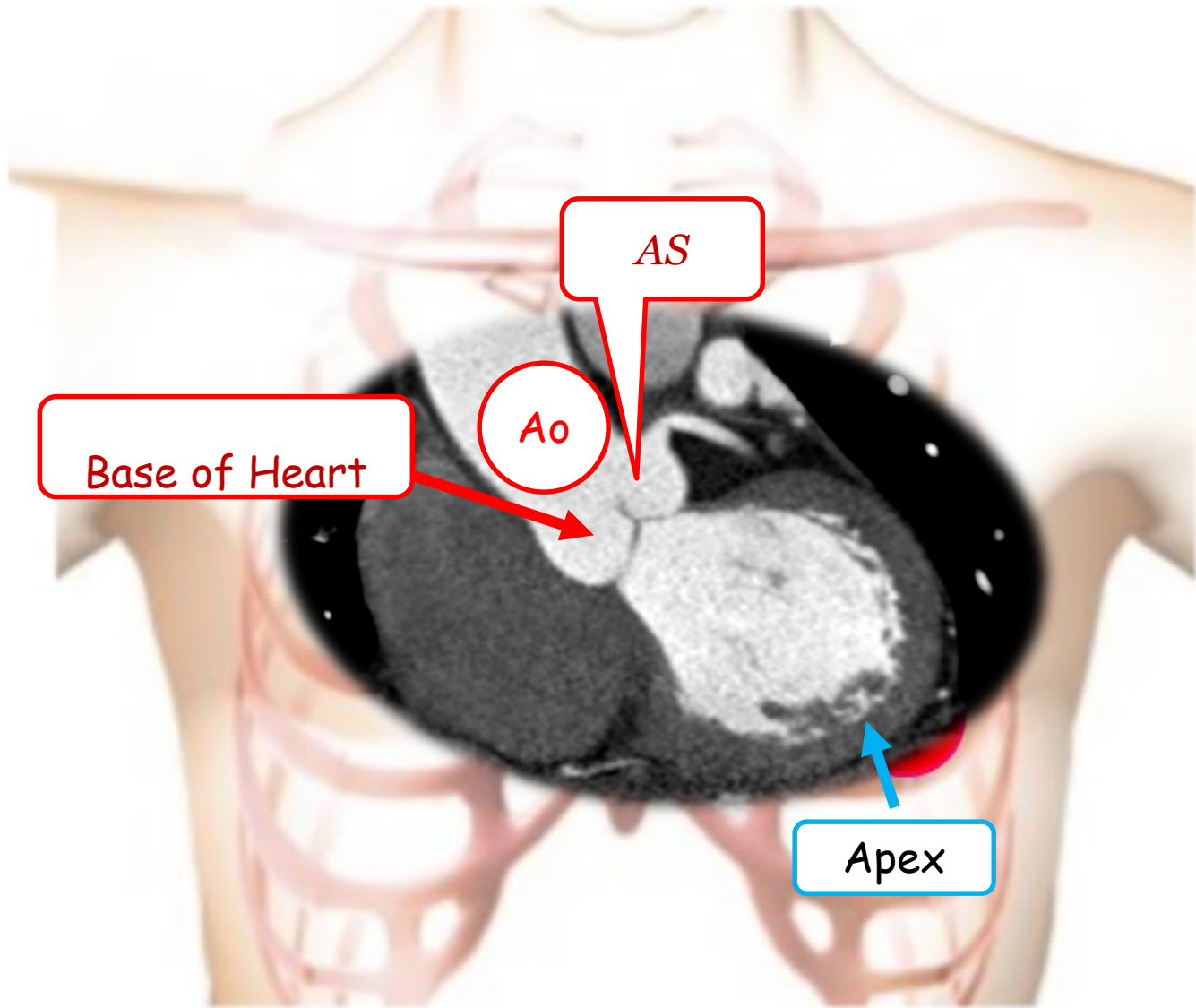
Location: RUSB (base) → carotids
Systolic



Aortic Stenosis

LV Outflow Obstruction



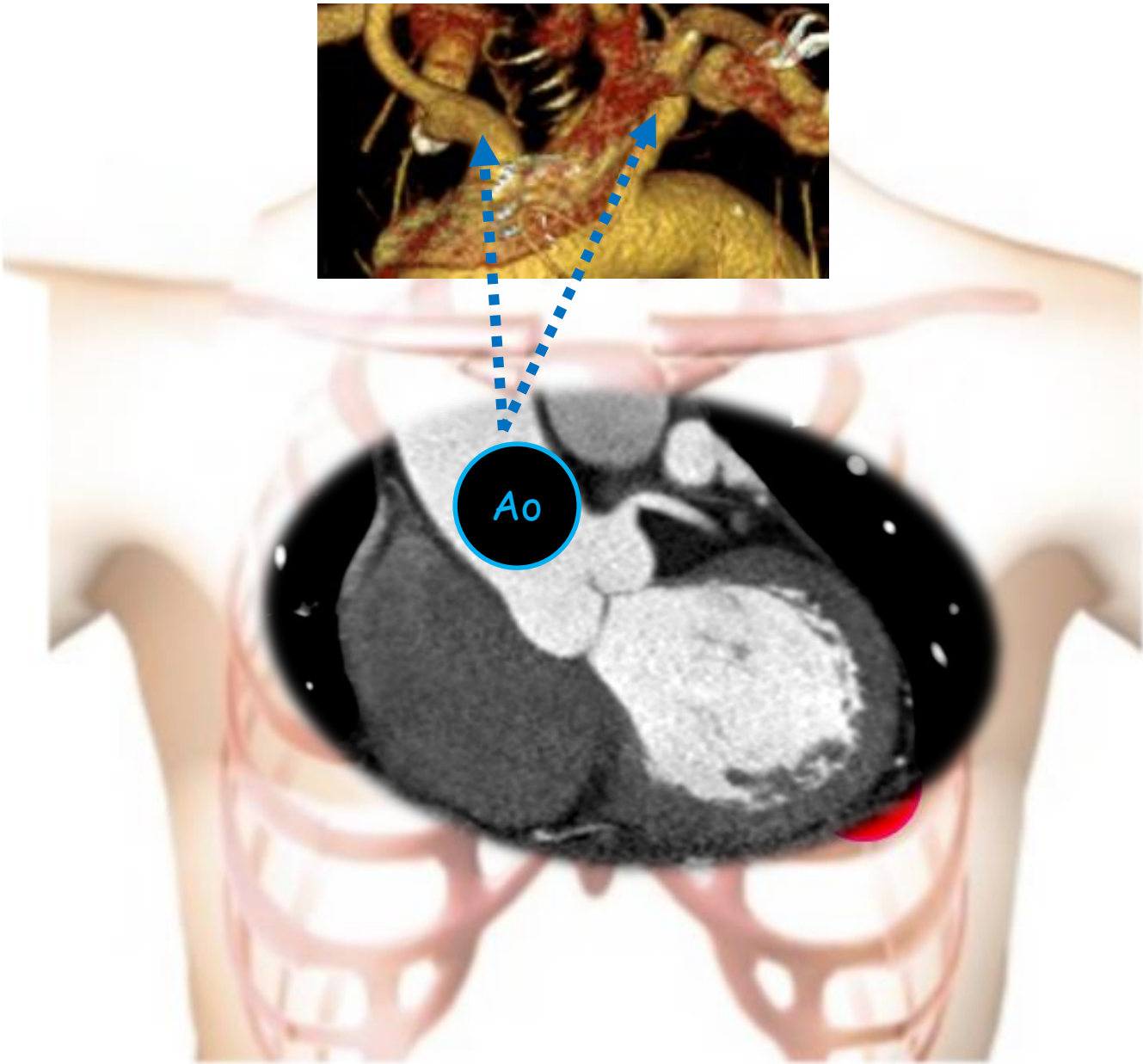


AS

Ao

Base of Heart

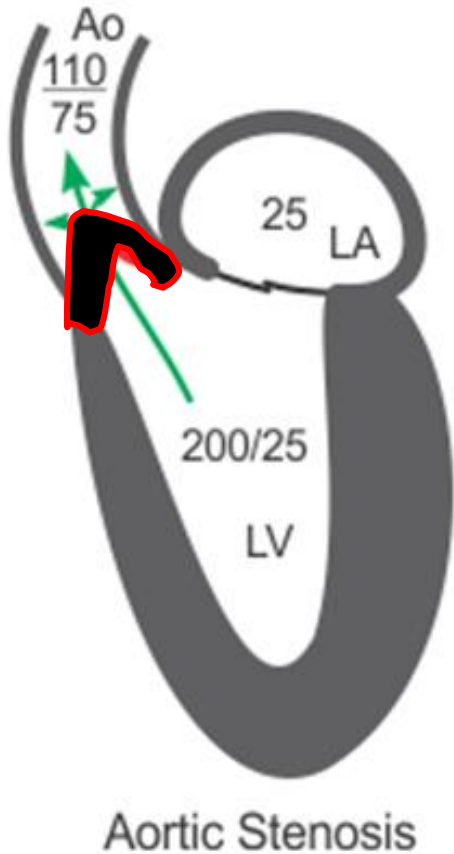
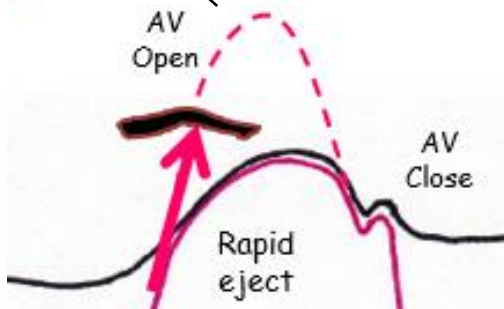
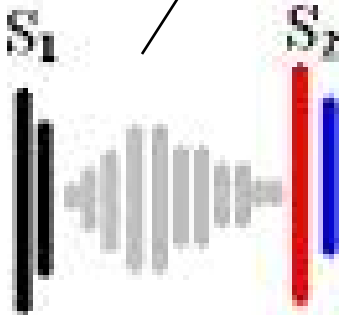
Apex



Aortic Valve Disorders

Stenosis

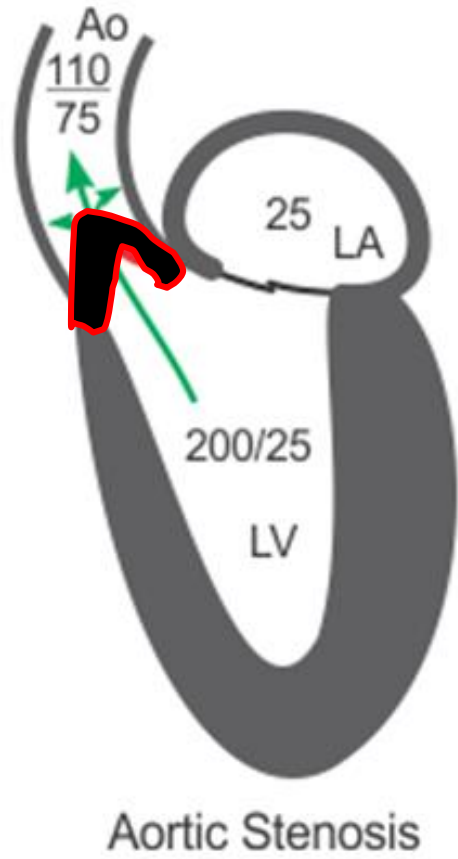
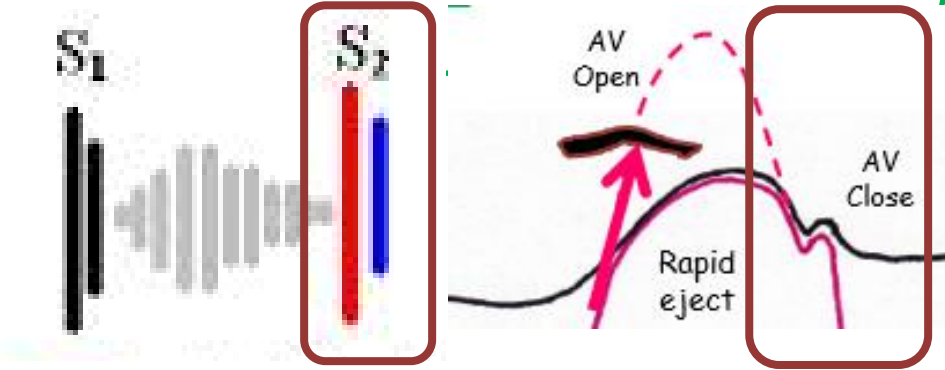
Location: RUSB (base) → carotids
Systolic
Quality: **crescendo-decrescendo**
↑
Rapid Ejection



Aortic Valve Disorders

Stenosis

Location: RUSB (base) → carotids
Quality: **crescendo-decrescendo**
↑
Rapid Ejection



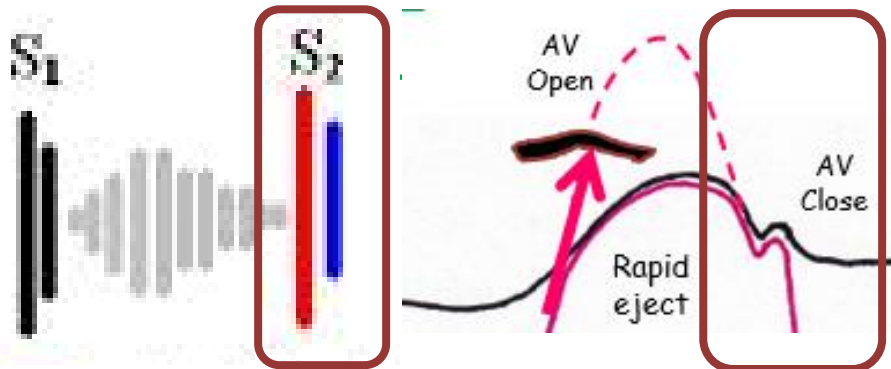
Aortic Valve Disorders

Stenosis

Location: RUSB (base) → **carotids**

Failure to radiate to the carotids
AND
Normal intensity of S2

Non-Critical AS



Aortic Valve Disorders

Stenosis

Location: RUSB (base) → carotids
Systolic
Quality: *crescendo-decrescendo*

Black Box Warning:

The NBME assumes you can identify the murmur.
It is a rare question that asks you to name the murmur.
They present the abnormal physical exam and then launch derivatives.

Aortic Valve Disorders

Stenosis

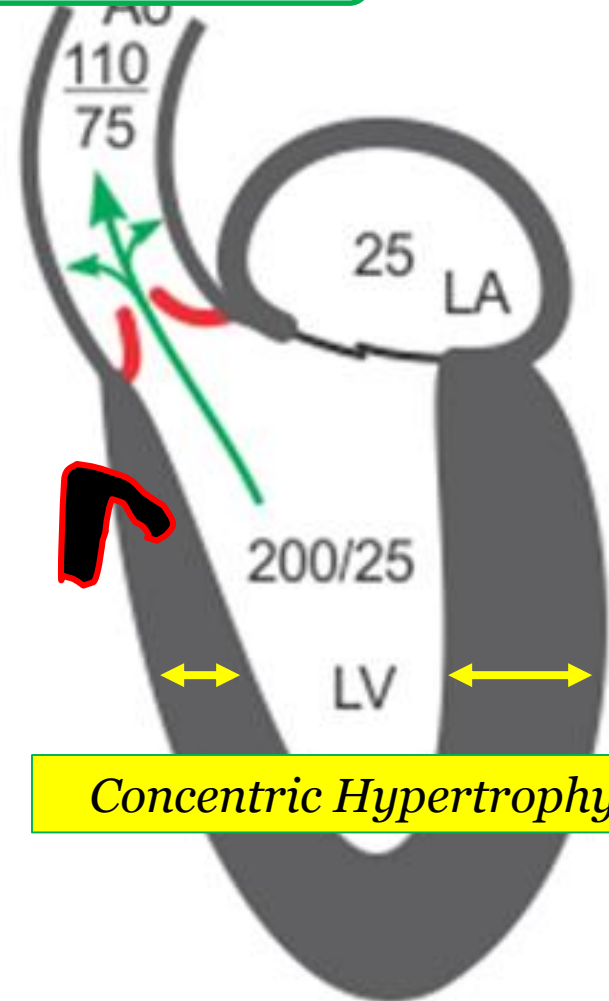
Location: RUSB (base) → carotids
Systolic

Quality: *crescendo-decrescendo*

Key points:

Associated with congenital bicuspid (TS)

Obstructive physiology → *LVH*



Aortic Stenosis

Aortic Valve Disorders

Stenosis

Location: RUSB (base) → carotids
Systolic

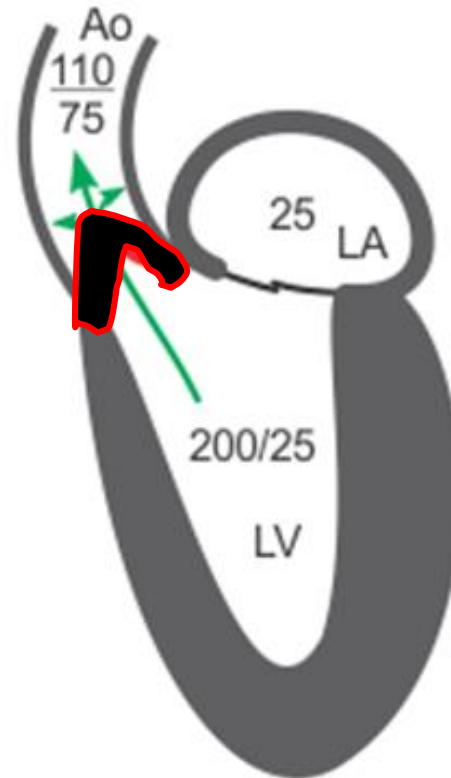
Quality: *crescendo-decrescendo*

Key points:

Associated with congenital bicuspid (TS)

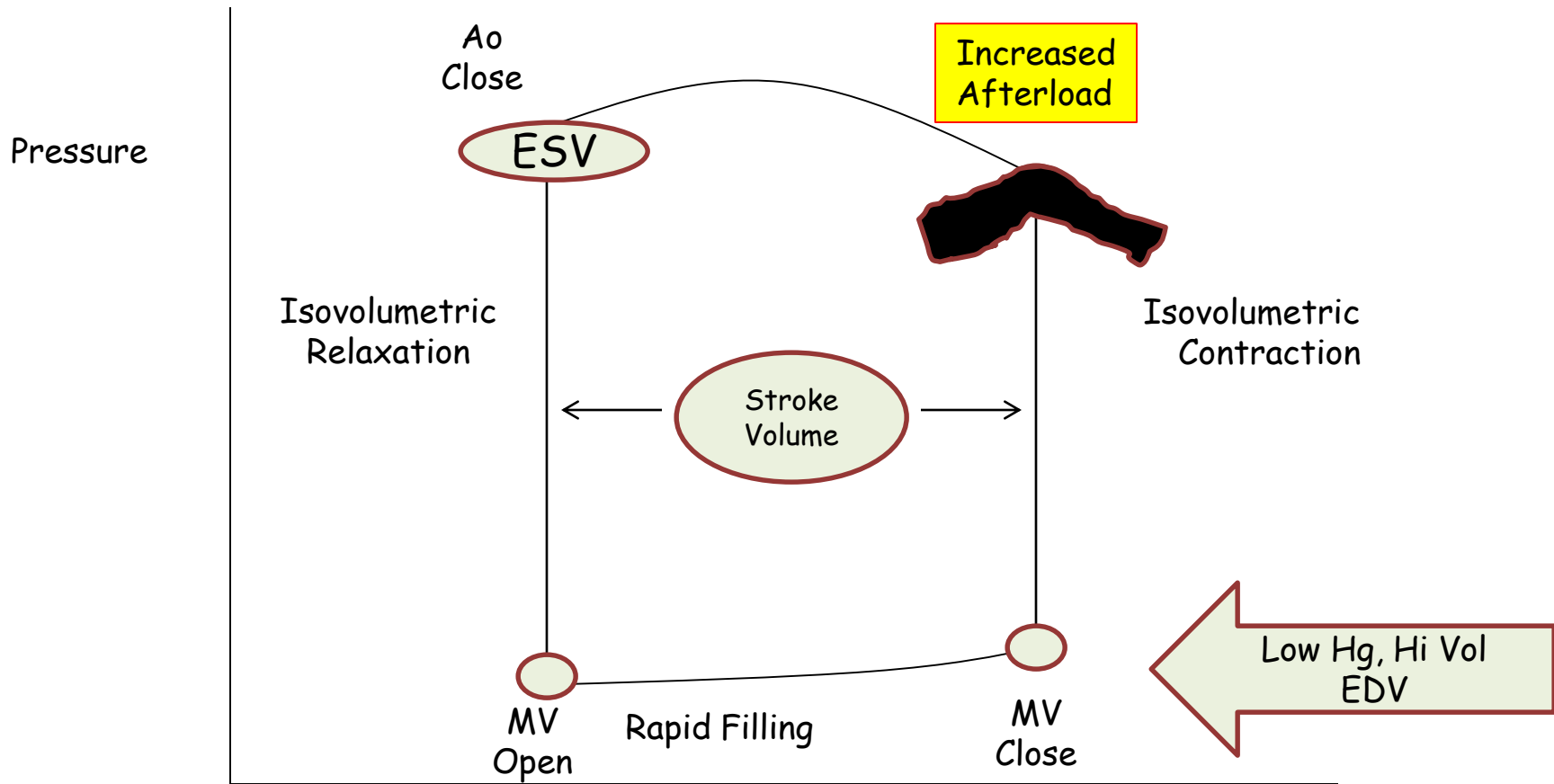
Obstructive physiology → *LVH*

↑ Afterload (*prototypical*)



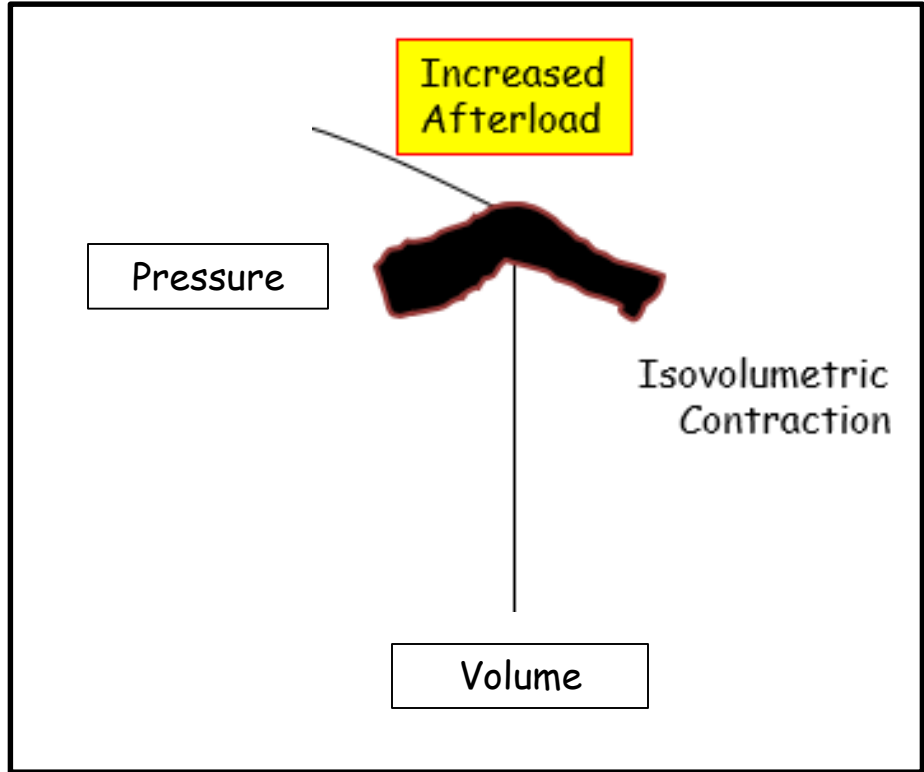
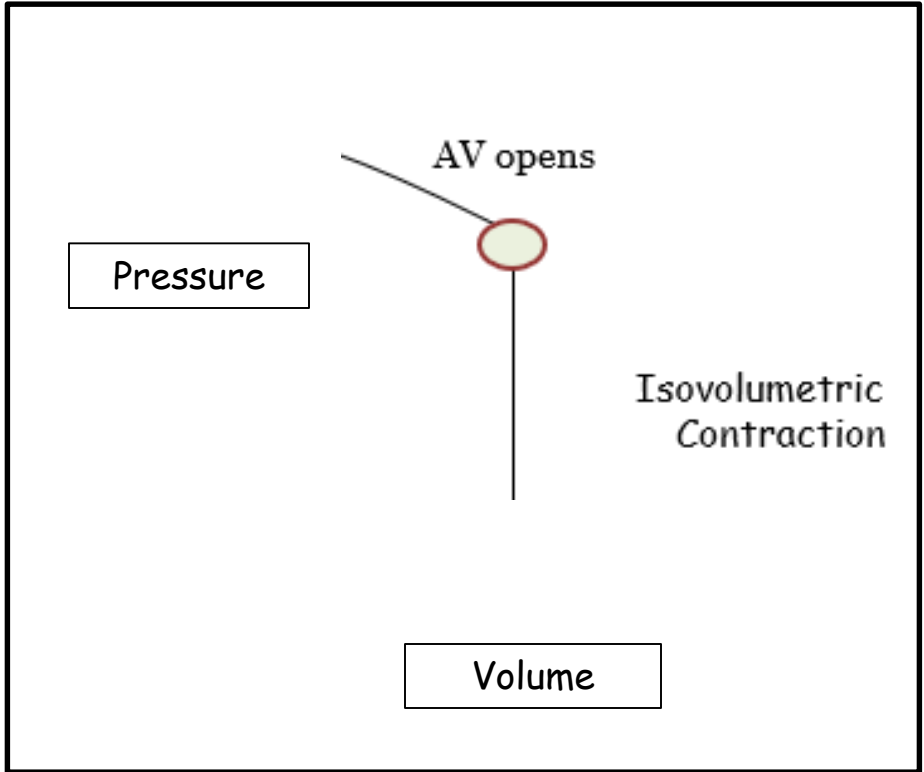
Aortic Stenosis

~ Aortic Stenosis Hemodynamics I ~

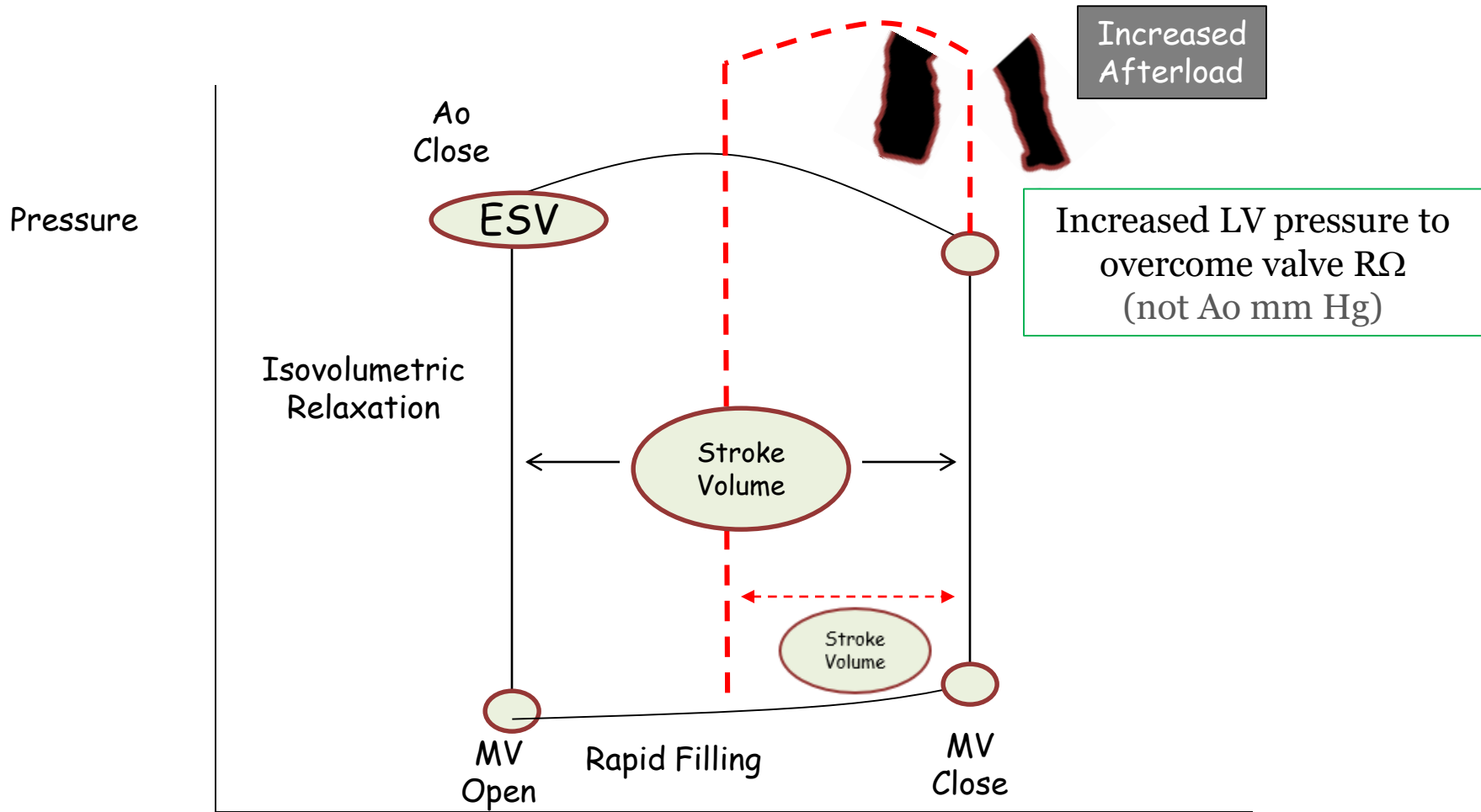


$$SV = EDV - ESV$$

Volume



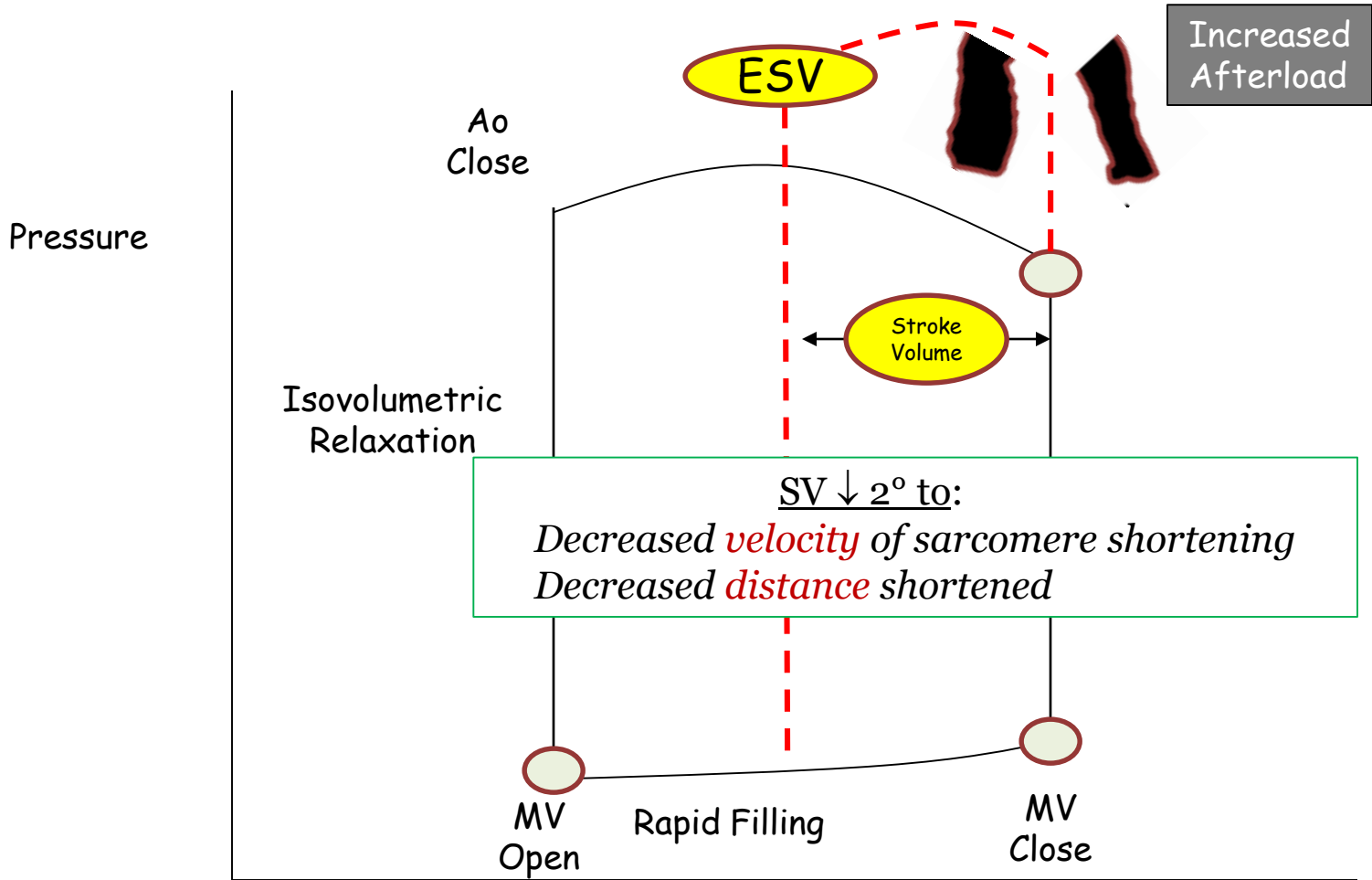
~ Aortic Stenosis Hemodynamics I ~



$SV = EDV - ESV$

Volume

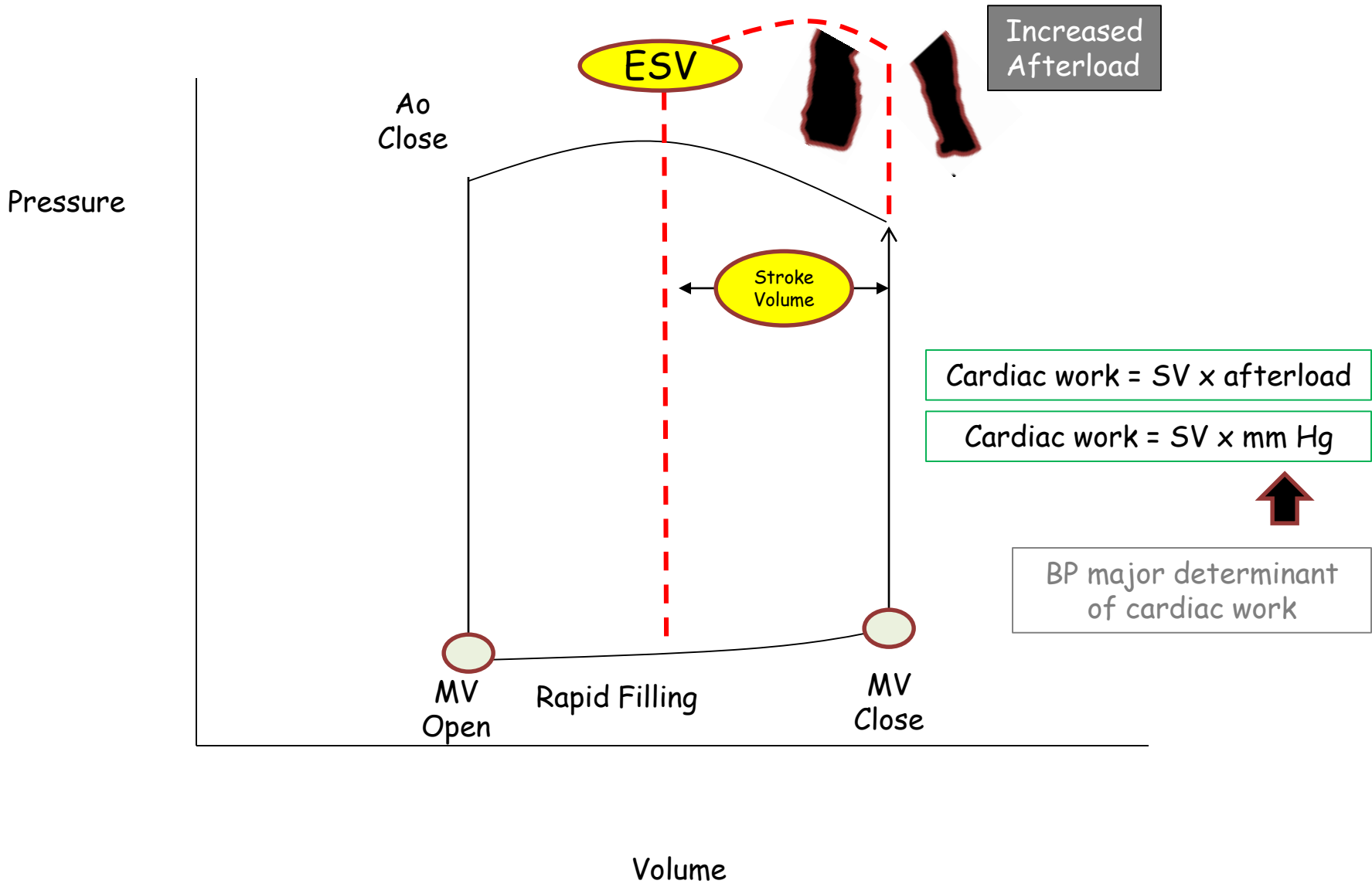
~ Aortic Stenosis Hemodynamics I ~



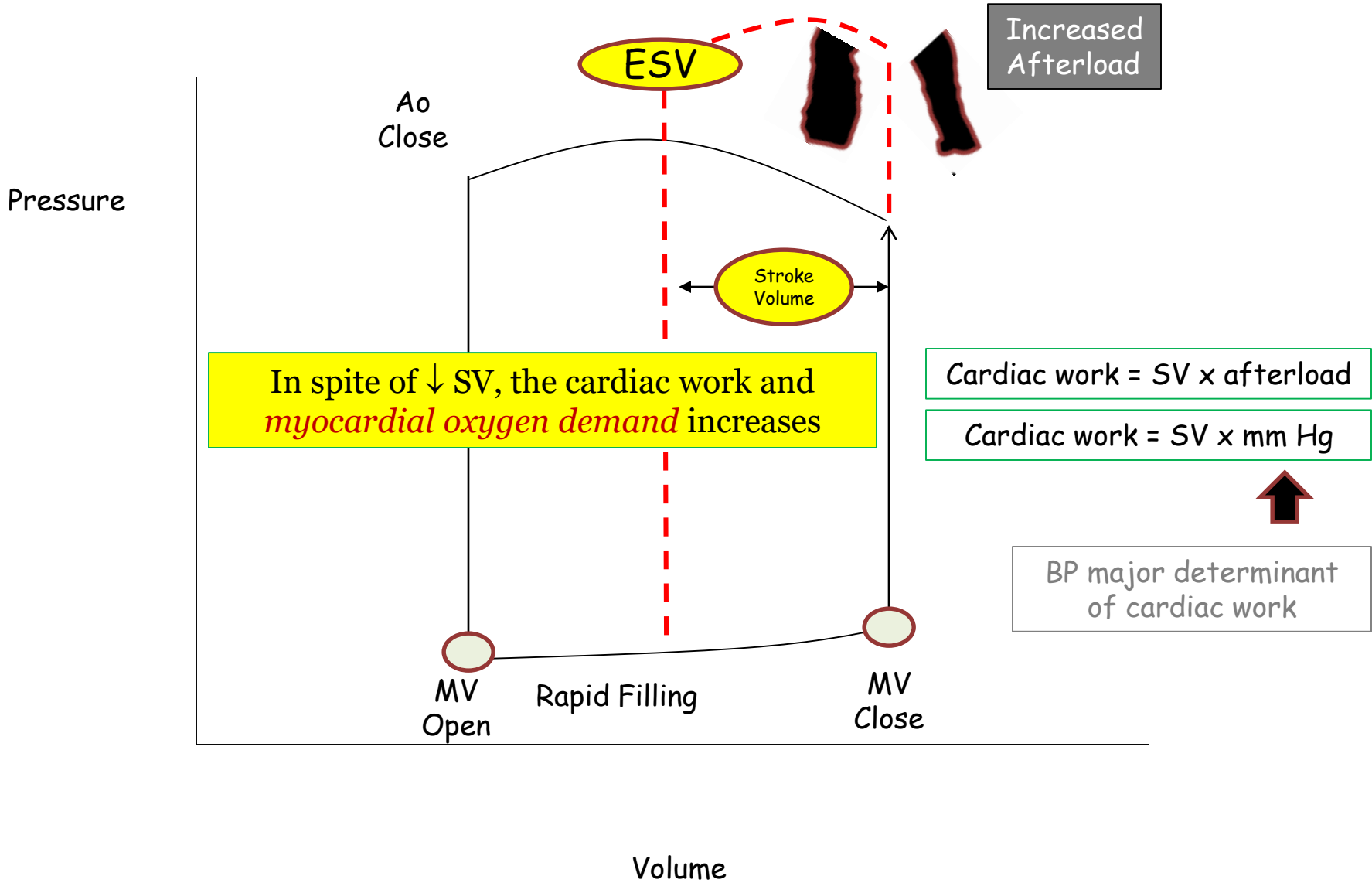
$SV = EDV - ESV$

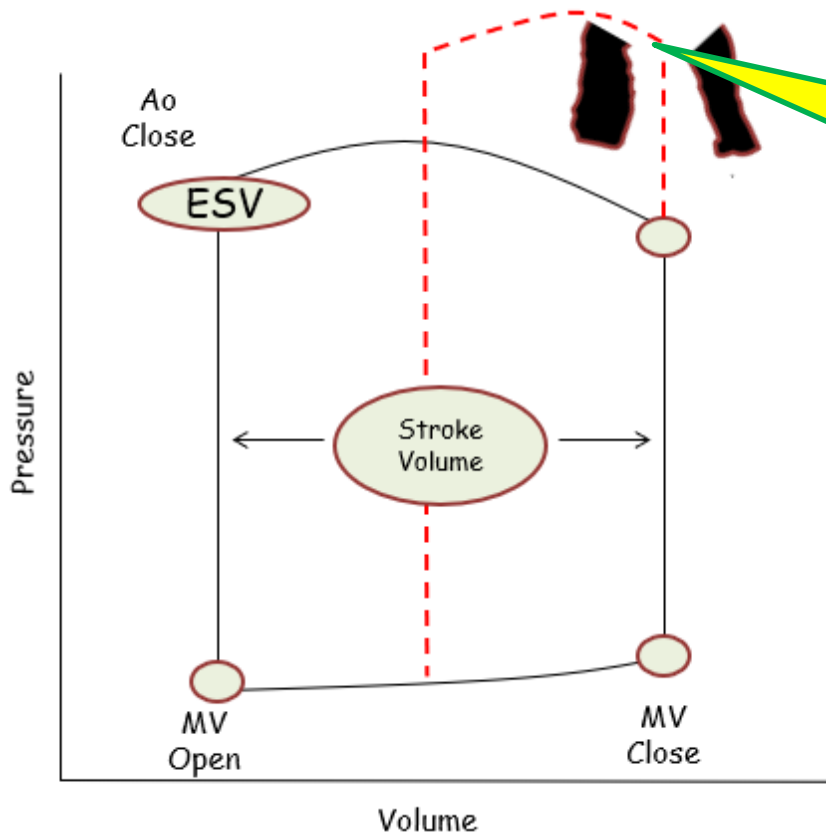
Volume

~ Aortic Stenosis Hemodynamics I ~



~ Aortic Stenosis Hemodynamics I ~

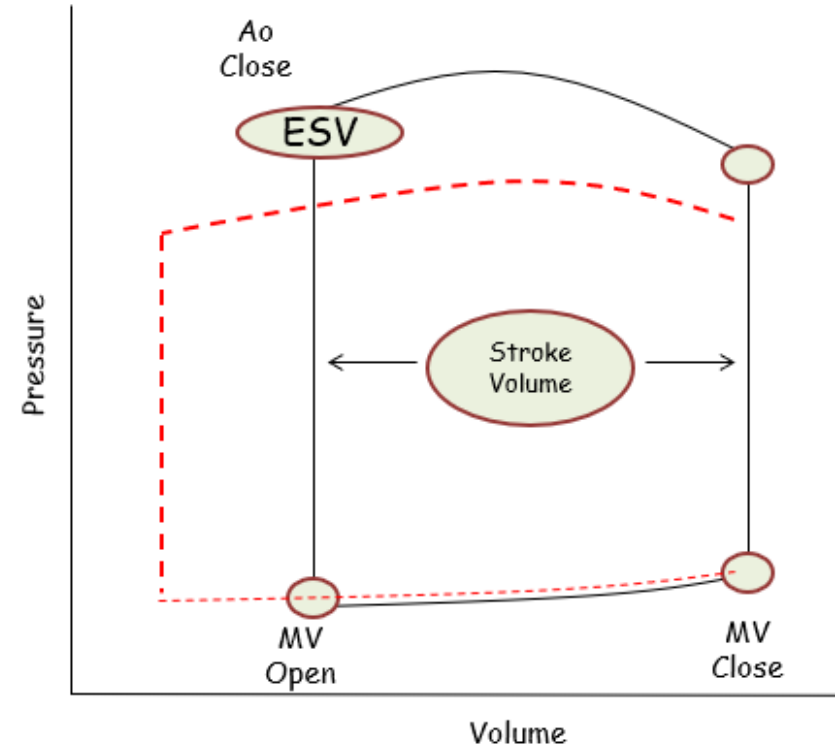
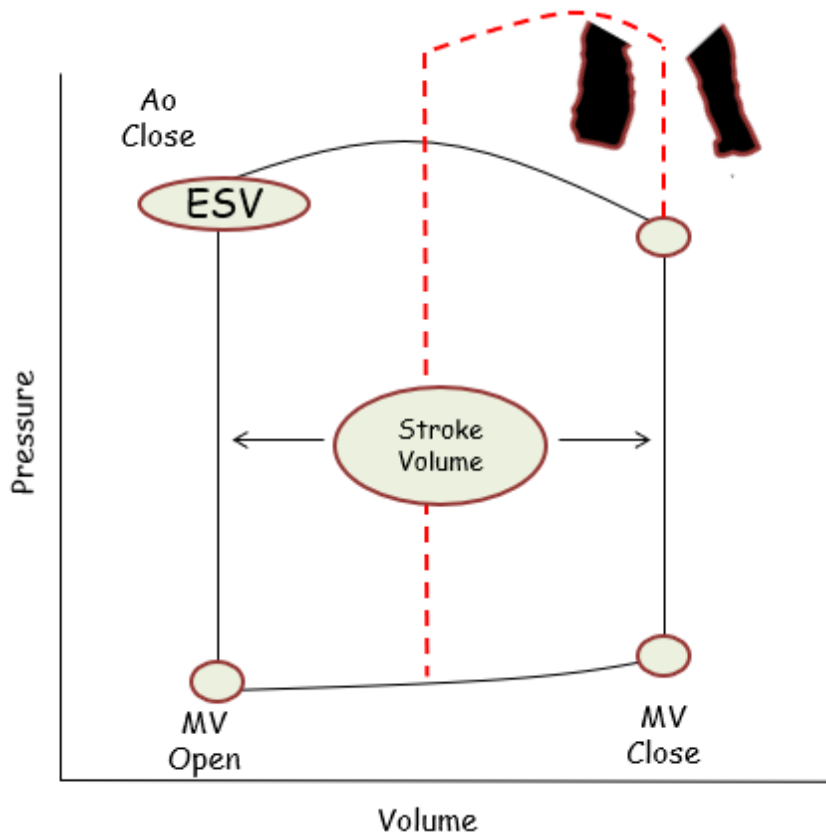




Increased Afterload (AS)

- Decreased velocity of shortening
- Decreased distance shortened
- Decreased SV
- Increased cardiac work
- Increased myocardial oxygen consumption

Compare and Contrast



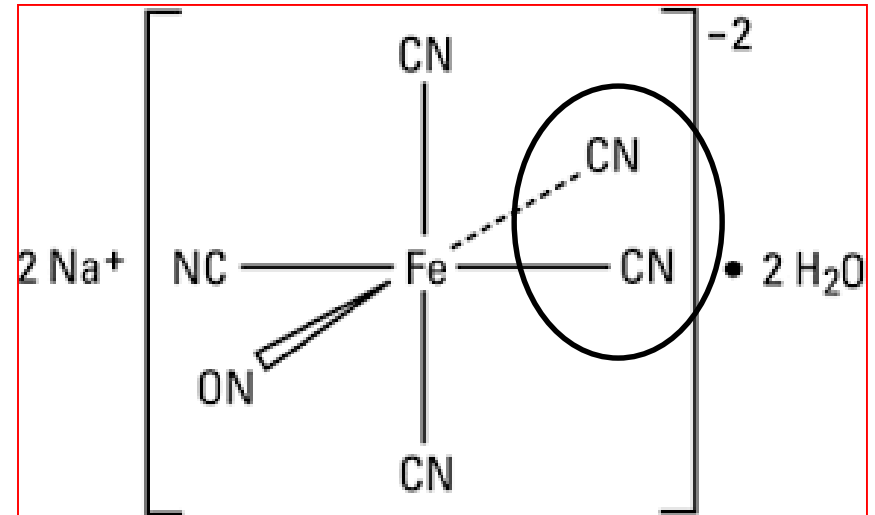
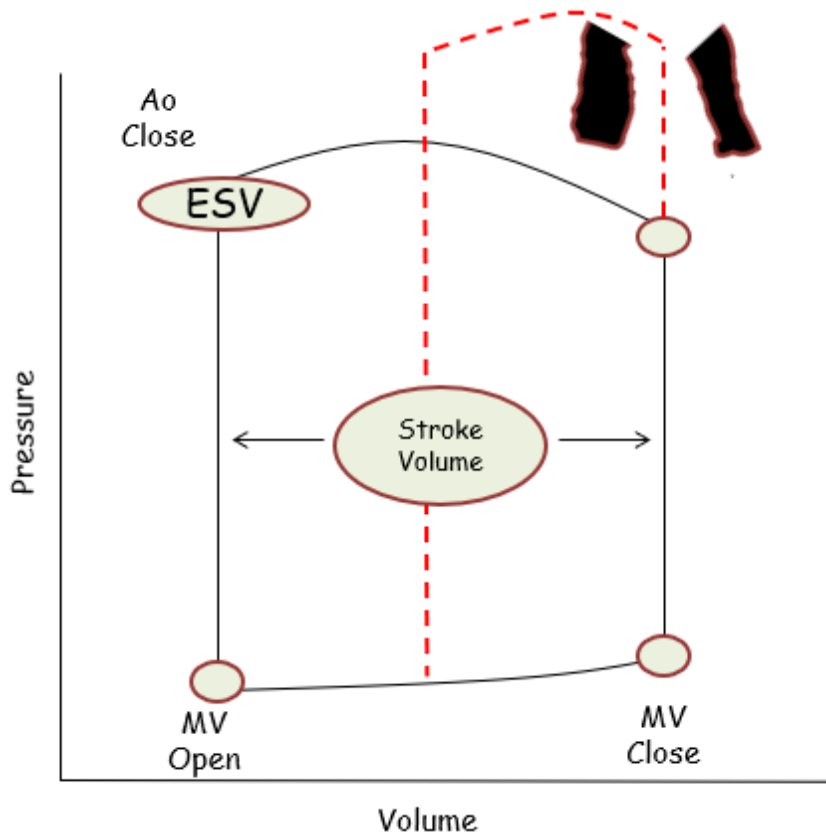
Increased Afterload (AS)

- Decreased velocity of shortening
- Decreased distance shortened
- Decreased SV
- Increased cardiac work
- Increased myocardial oxygen consumption

Decreased Afterload (Nitroprusside)

Treatment of Choice for
Malignant HTN (on Step One)

Compare and Contrast



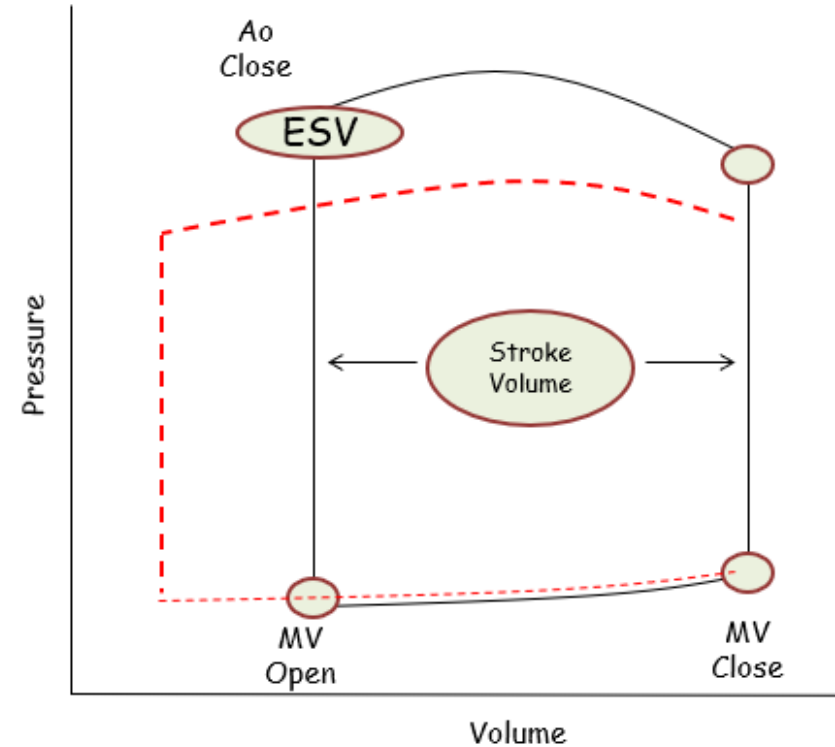
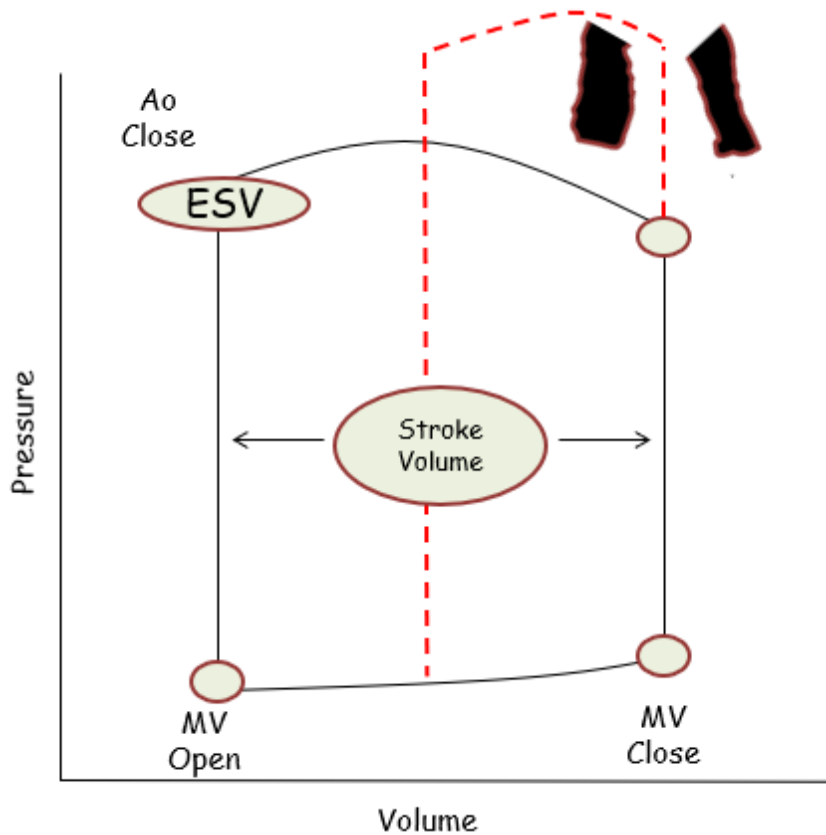
Decreased Afterload (Nitroprusside)

Increased Afterload (AS)

- Decreased velocity of shortening
- Decreased distance shortened
- Decreased SV
- Increased cardiac work
- Increased myocardial oxygen consumption



Compare and Contrast

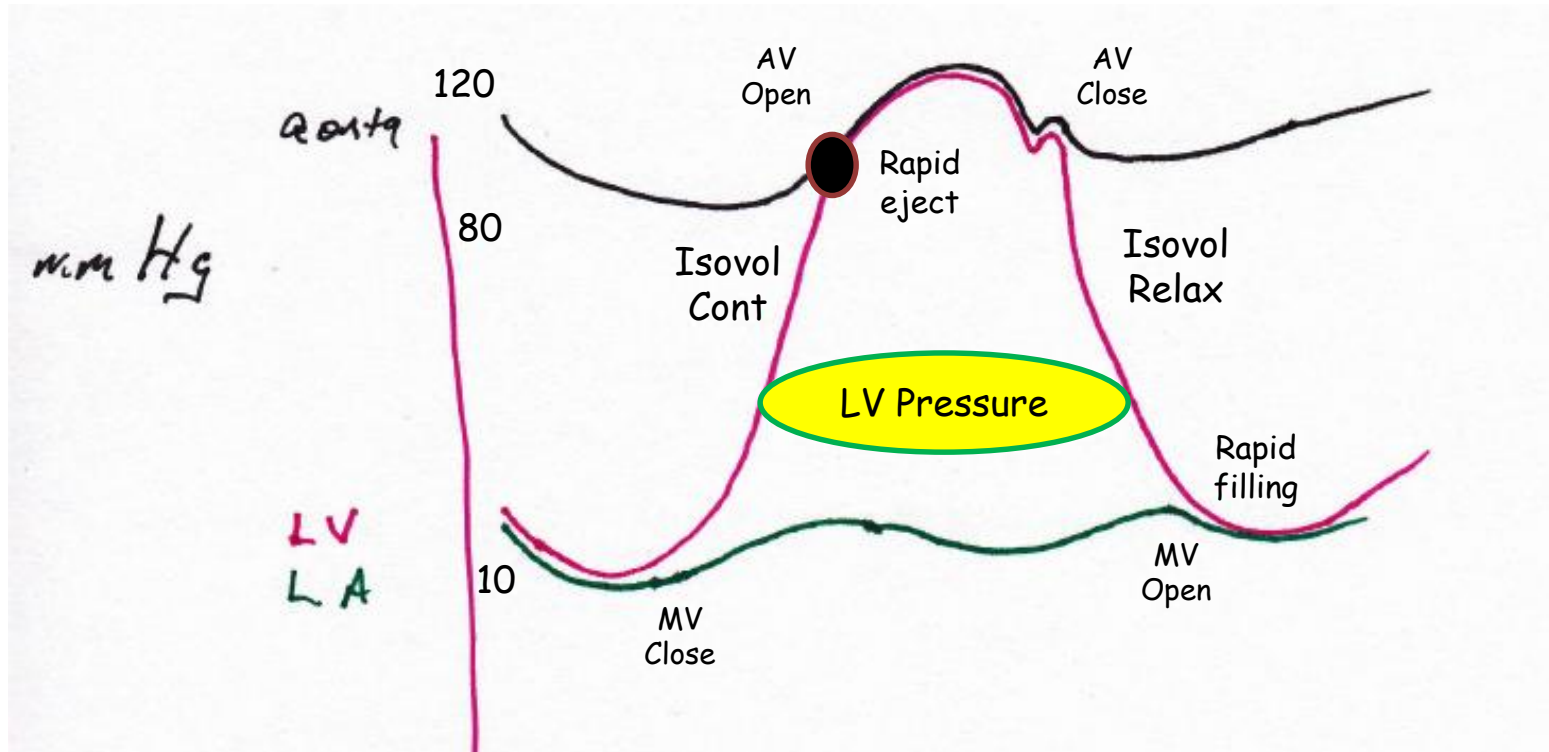


Increased Afterload (AS)

- Decreased velocity of shortening
- Decreased distance shortened
- Decreased SV
- Increased cardiac work
- Increased myocardial oxygen consumption

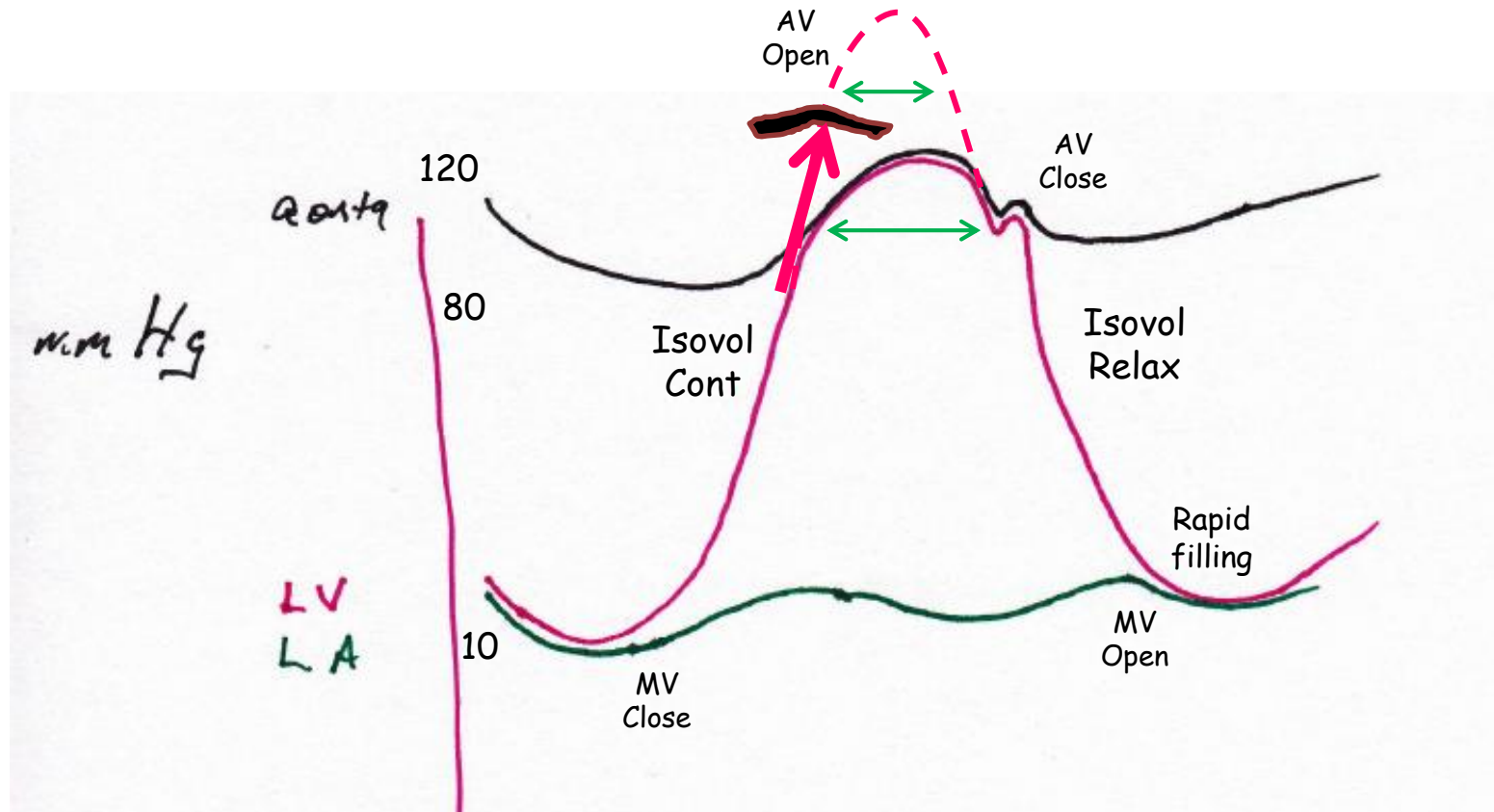
Decreased Afterload (Nitroprusside)

Aortic Stenosis Hemodynamics II



What happens to the **LV mm Hg** curve with aortic stenosis?

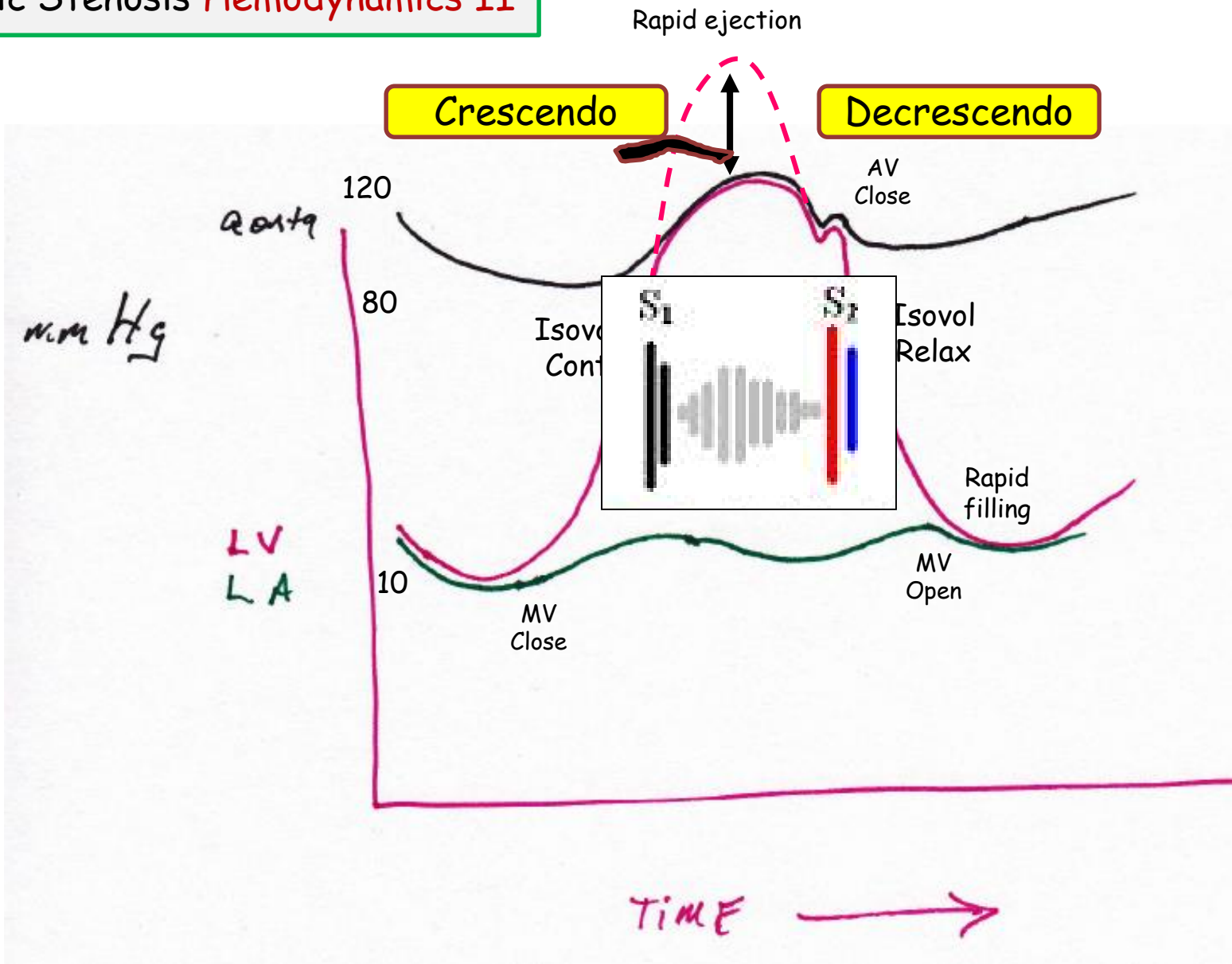
Aortic Stenosis Hemodynamics II



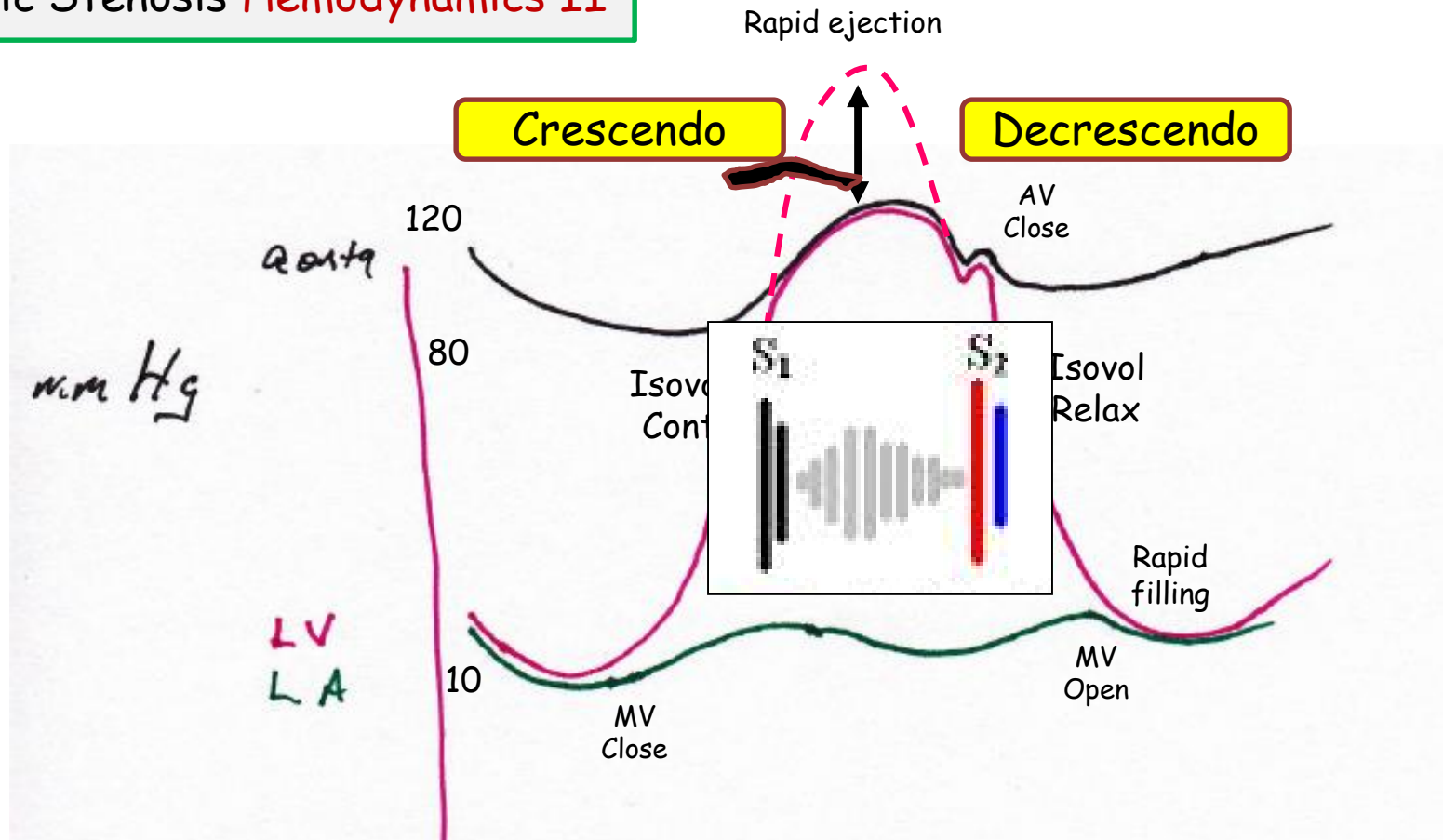
What happens to the LV mm Hg curve with aortic stenosis?

LV pressure has to surpass resistance of the stenotic valve.

Aortic Stenosis Hemodynamics II



Aortic Stenosis Hemodynamics II



What happens to the LV mm Hg curve with aortic stenosis?

LV pressure has to increase (surpassing Ao Hg) to open stenotic valve.

Peak murmur intensity?

Symptoms

SCD

Angina

Syncope

CHF

Symptoms

Angina

Where are the coronary ostia located?

Symptoms

SCD

Angina

Syncope

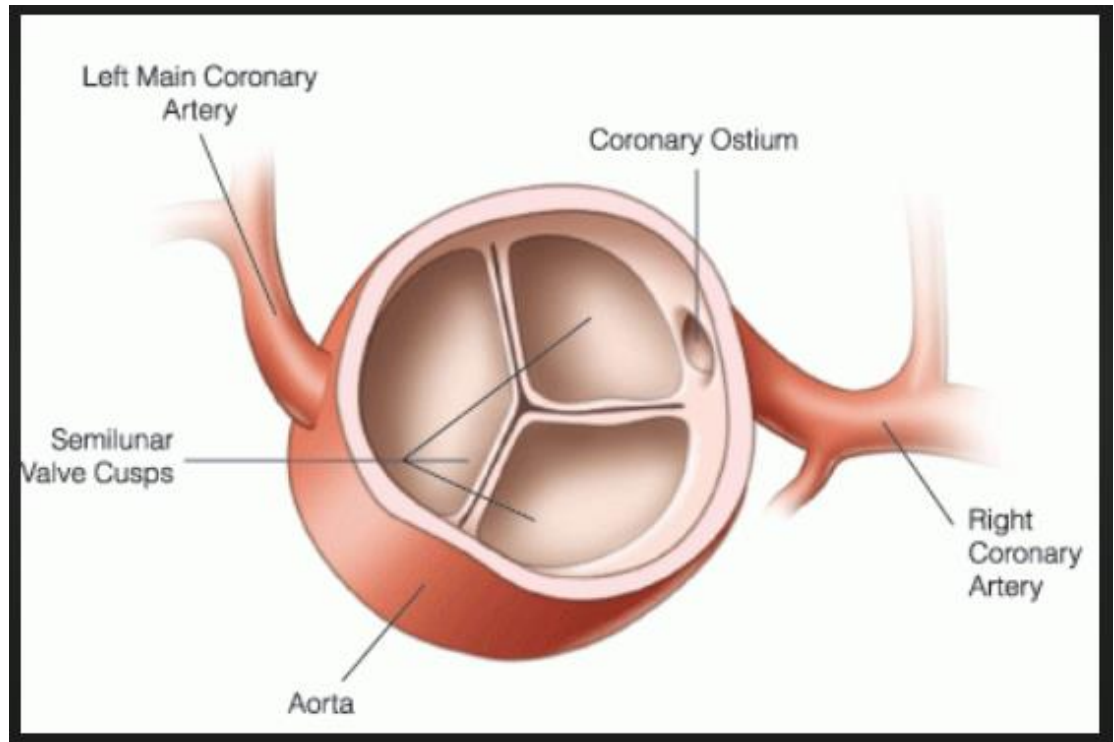
CHF

Symptoms

Angina

Where are the coronary ostia located?:

Above aortic valve



Symptoms

SCD

Angina

Syncope

CHF

Symptoms

Angina

Where are the coronary ostia?:

Above aortic valve

Symptoms

Syncope* → Obstructive basis.

** may be described by LH or dizziness*

Symptoms

SCD

Angina

Syncope

CHF

Symptoms

Angina

Where are the coronary ostia?:

Above aortic valve

Symptoms

Syncope → Obstructive basis.

If they describe a patient with systolic murmur and syncope how will you distinguish between AS and HCM?

Symptoms

SCD

Angina

Syncope

CHF

Symptoms

Syncope → Obstructive basis.

If they describe a patient with systolic murmur and syncope, how will you distinguish between AS and HCM?

HCM: FH SCD, young age/athlete, dysrhythmia, maneuvers (PE and cath lab), pathology

AS: older (unless bicuspid), maneuvers not reliable, quality/location of murmur

What They Tell You, What They *Don't* Tell You

CHF

Increased afterload → Eventual Cardiac Decompensation

Symptoms

SCD

Angina

Syncope

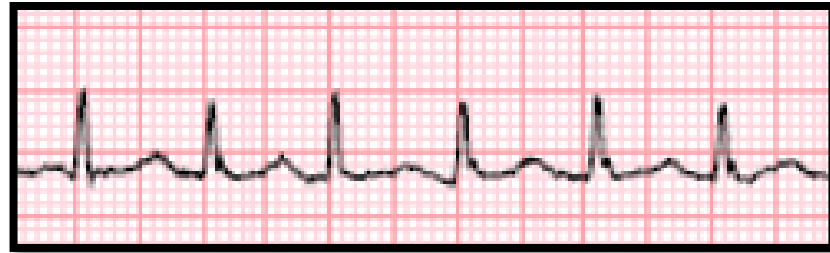
CHF

CHF

Increased afterload → Eventual Cardiac Decompensation
Atrial Fibrillation and Aortic Stenosis

Symptoms

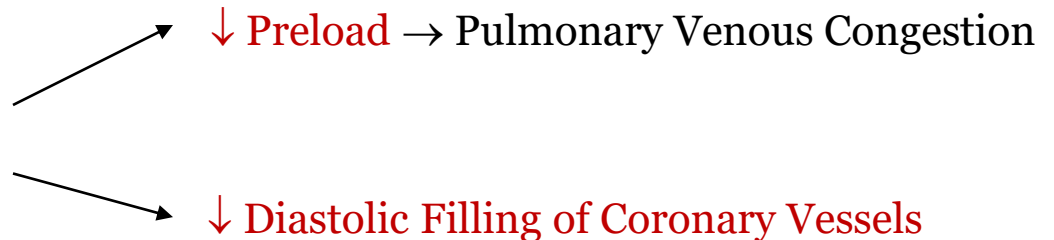
SCD
Angina
Syncope
CHF



Complications:

CHF
Ischemia

Fast heart rate → less time in diastole



Aortic Stenosis

Symptoms

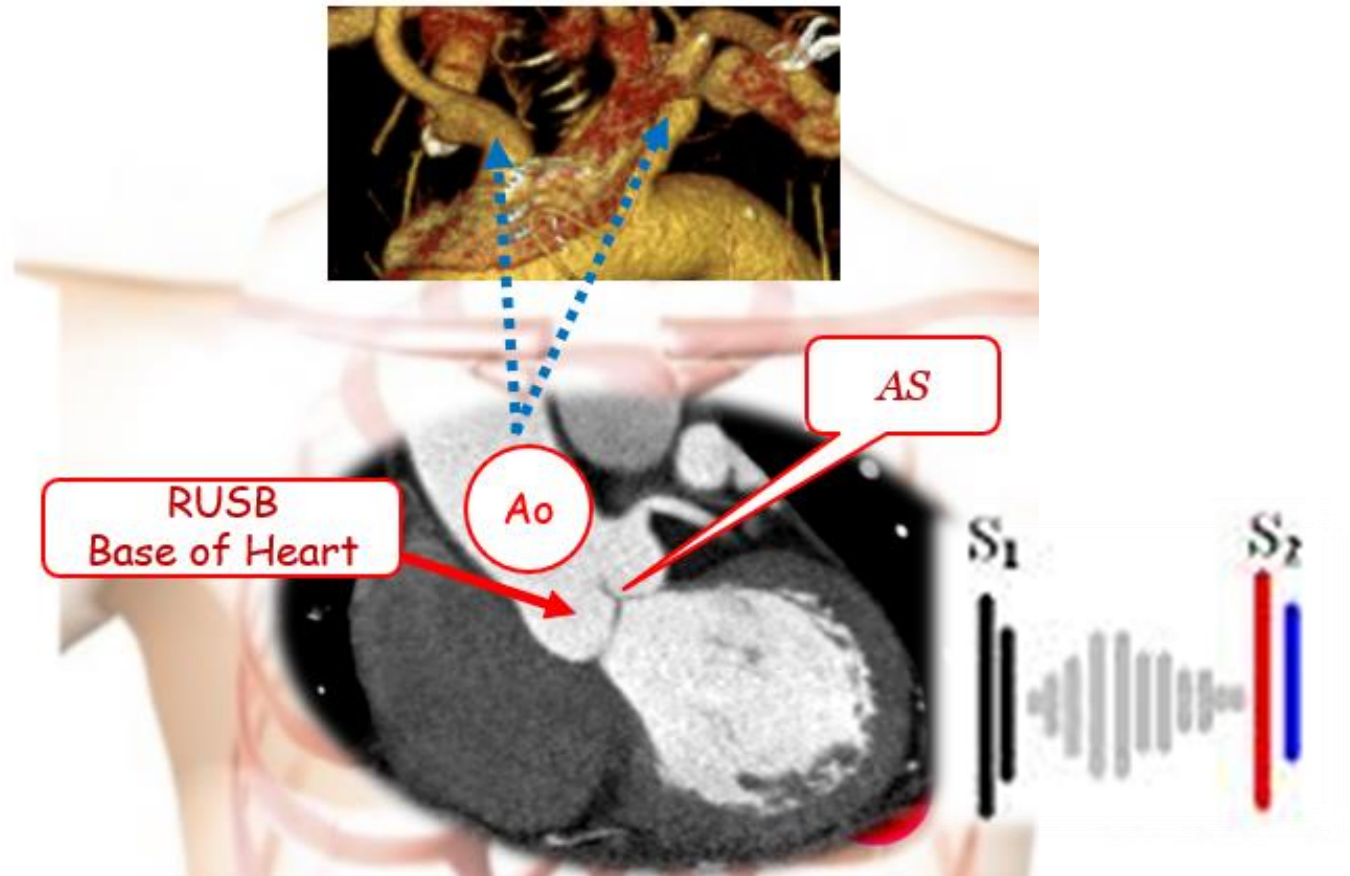
SCD

Angina

Syncope

CHF

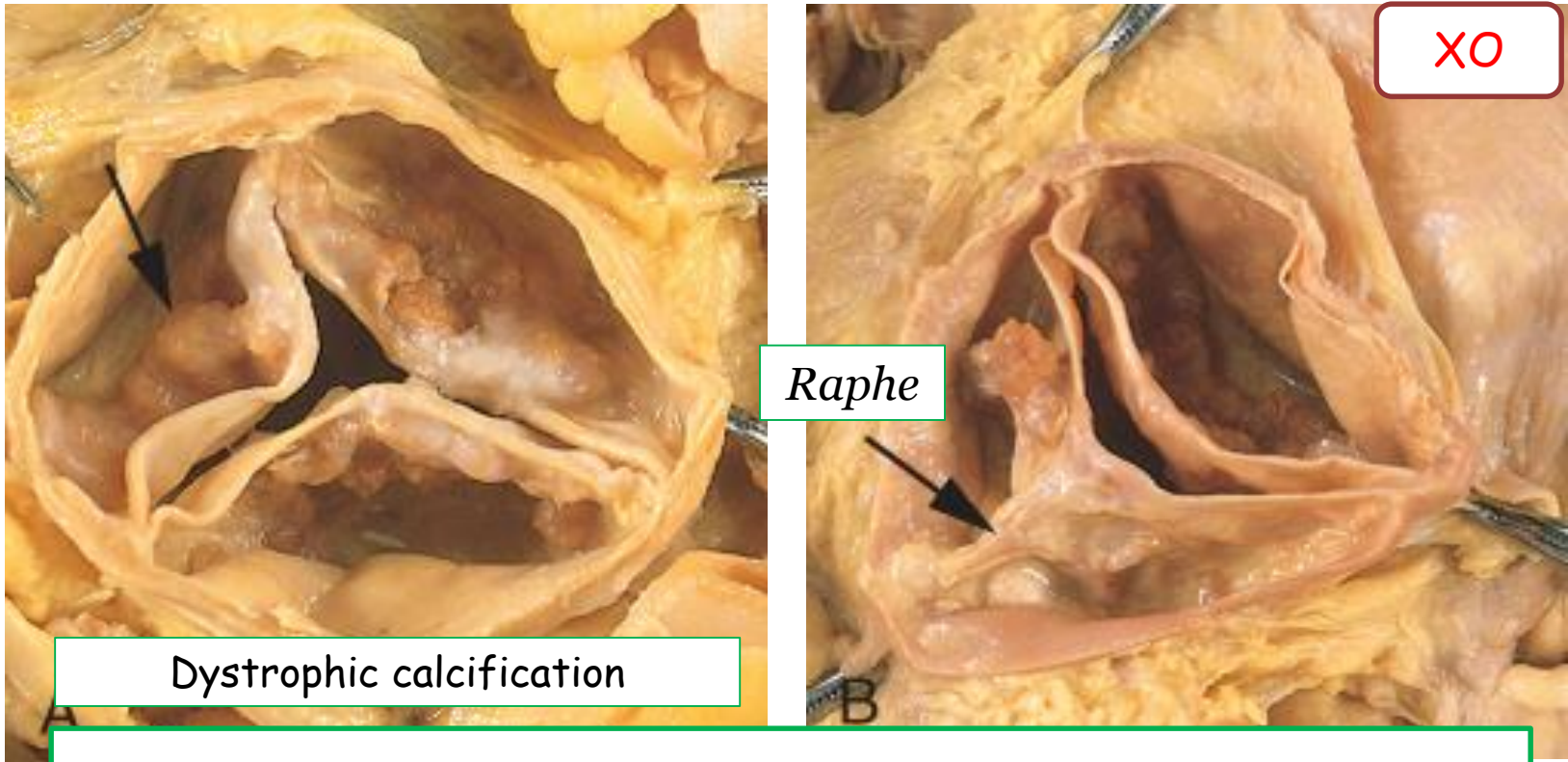
They use the signs and symptoms of aortic stenosis as a gateway condition to a number of loosely associated derivatives



Black Box Warning:

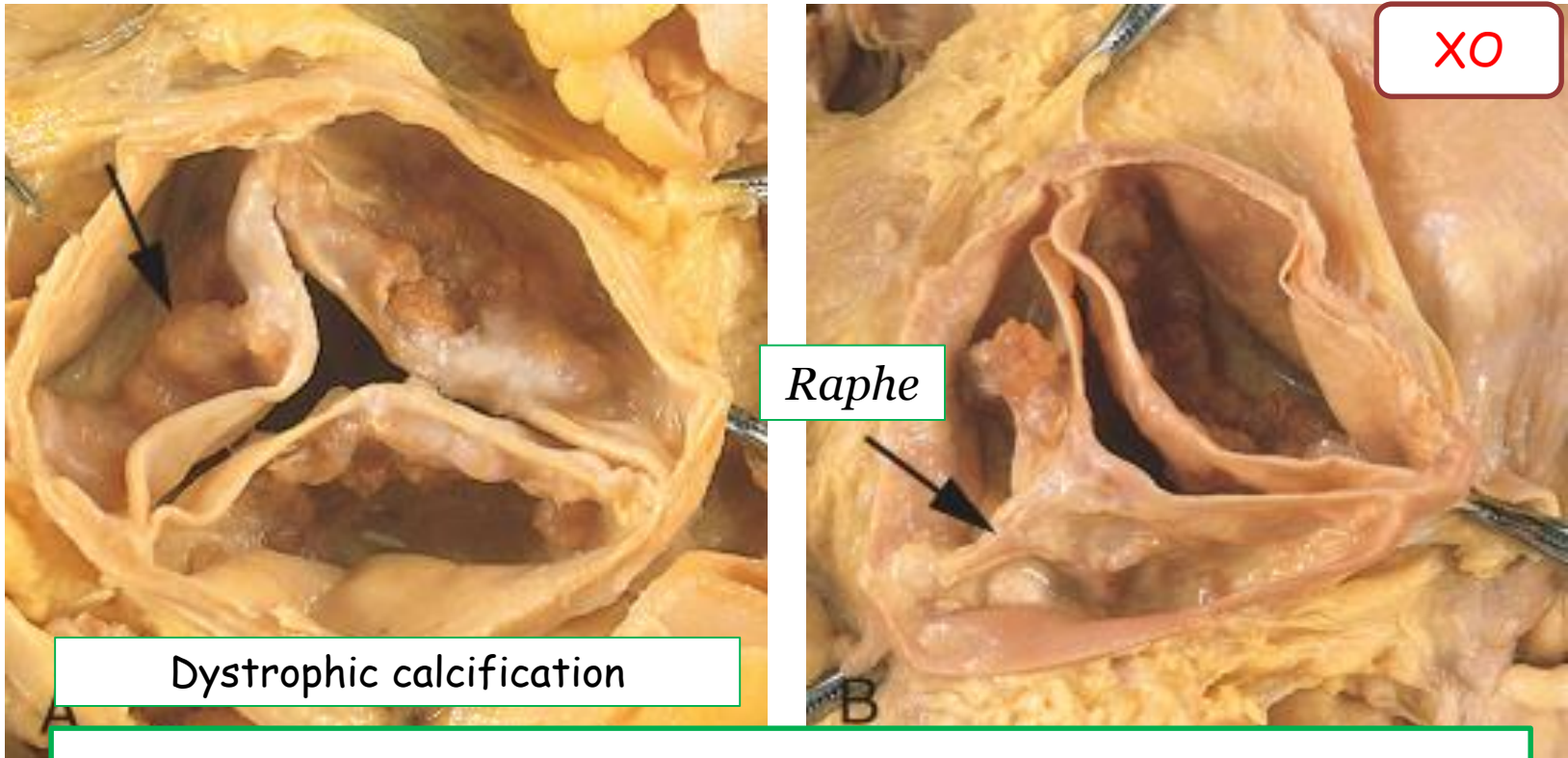
The NBME assumes you can identify the murmur.
They present the abnormal physical exam and then launch derivatives.

Aortic Stenosis: Pathology



Who gets AS (demographic description on Step One)?
Aged → degenerative; **dystrophic** calcification
~ Young or Turner syndrome with **congenital bicuspid** ~

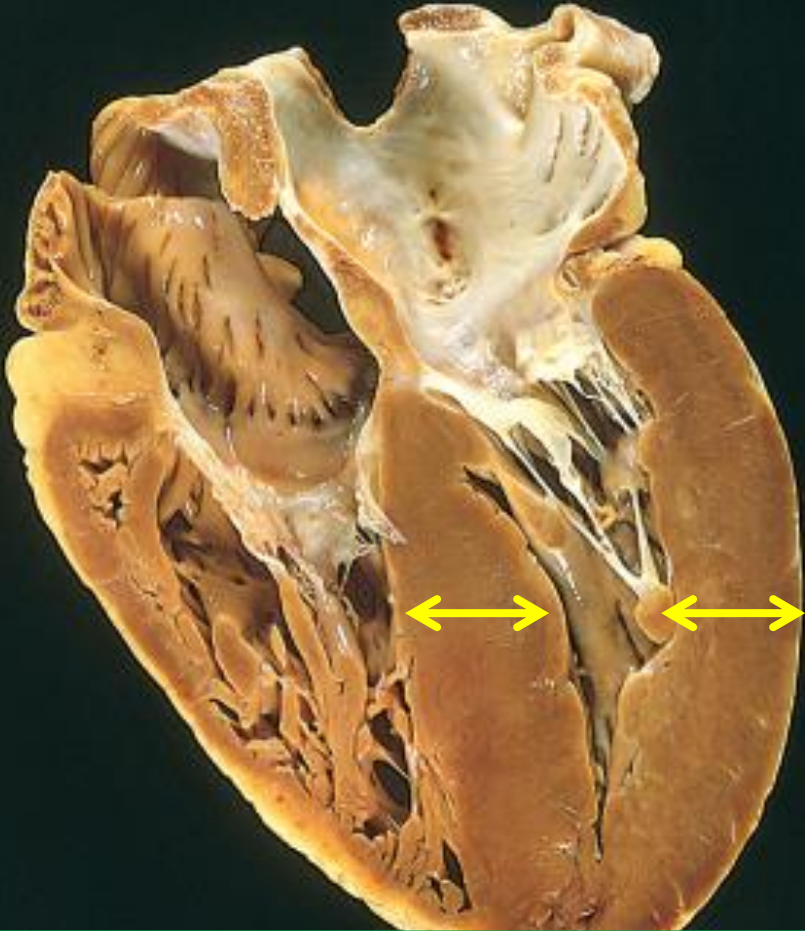
Aortic Stenosis: Pathology



Who gets AS (demographic description on Step One)?

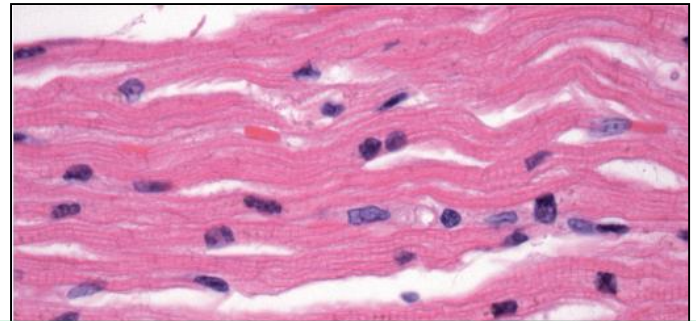
~ **Rheumatic Fever**, late manifestation ~

LVH: complication of pressure overload
(AS, HTN)

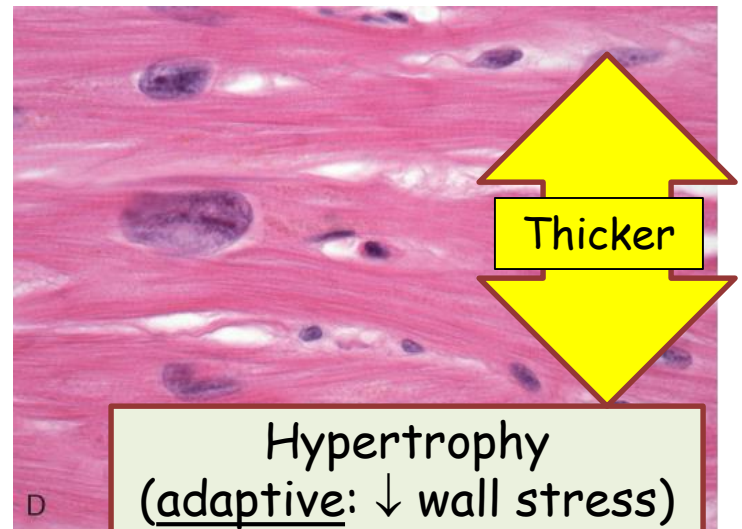


Concentric

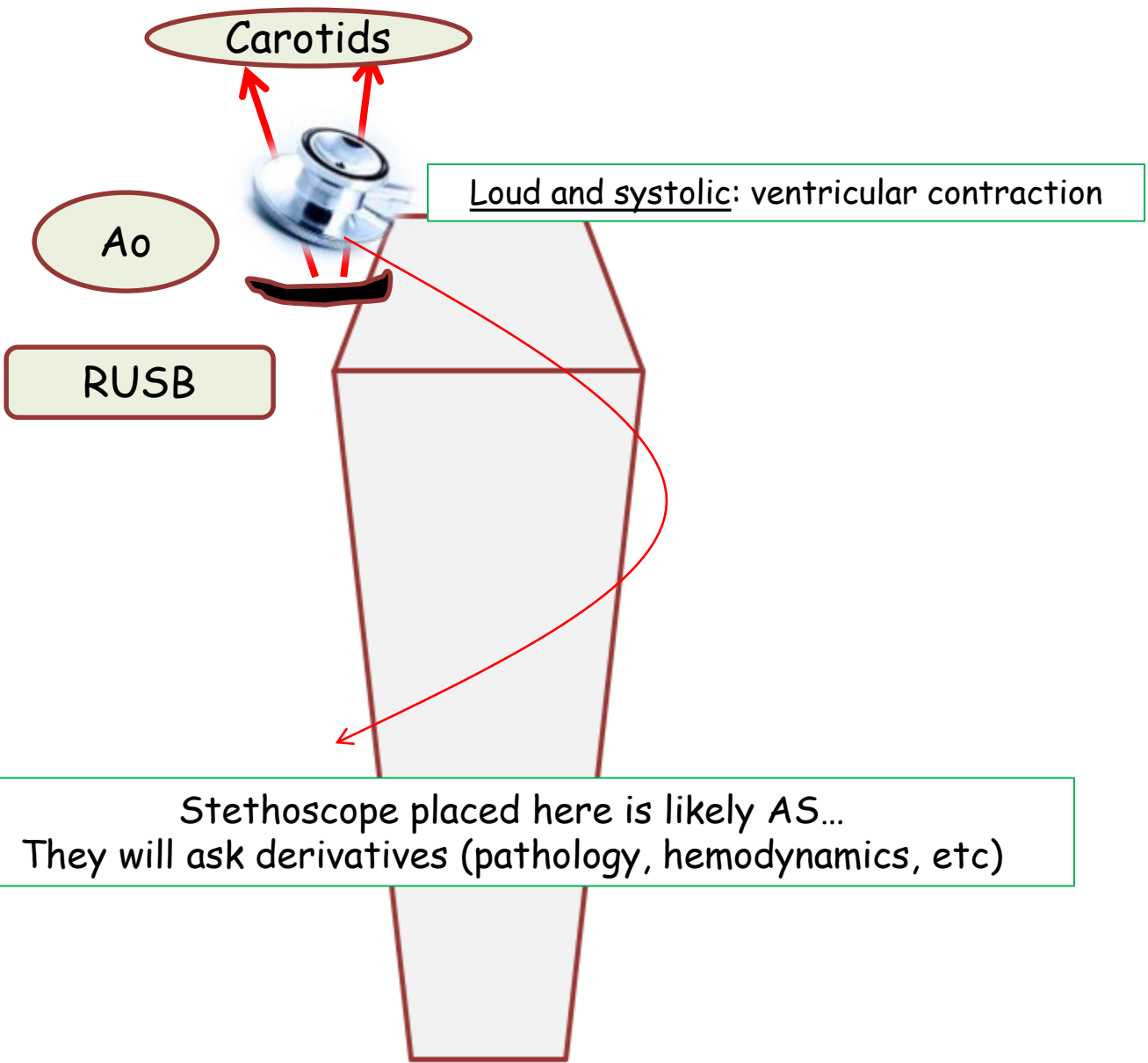
Normal myocardium



Wall Stress = $P \times r / 2h$
h - wall thickness
Thick wall, Low stress



Hypertrophy
(adaptive: ↓ wall stress)



Carotids

Ao

RUSB

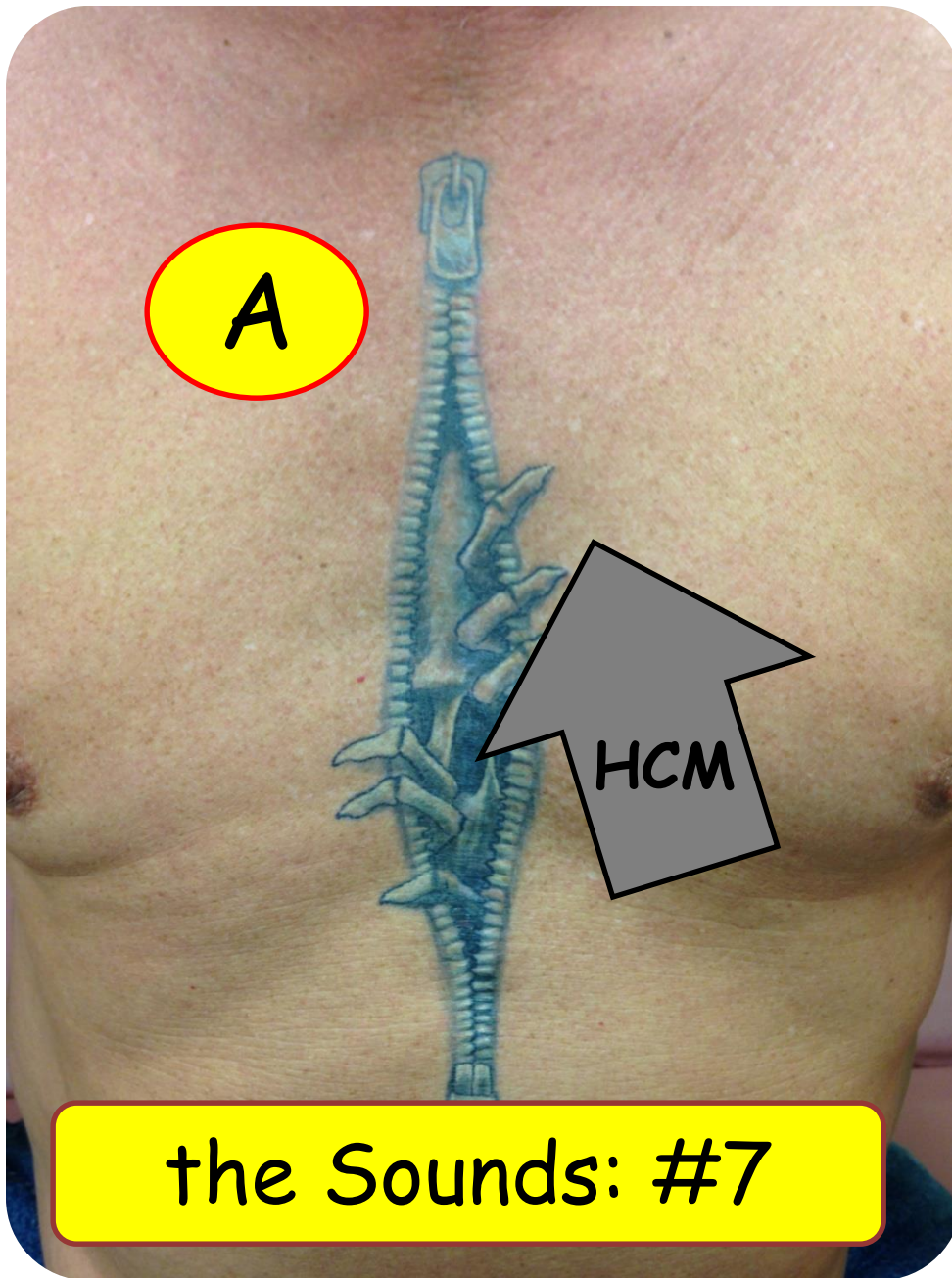
Loud and systolic: ventricular contraction

Stethoscope placed here is likely AS...
They will ask derivatives (pathology, hemodynamics, etc)

Aortic Stenosis

- Demographic
 - Elderly
 - Young patient with congenital bicuspid (and/or Turner's)
 - Late complication of rheumatic fever
- Physical Exam
 - RUSB/base
 - Crescendo-Decrescendo systolic murmur
 - Radiating to carotids
 - Severity affects intensity of S_2
- Hemodynamics
 - Increased afterload: derivatives and the pressure-volume curve
 - Compare and contrast with the decreased afterload curve
 - Cardiac cycle curve: peak murmur intensity
- Pathology
 - Dystrophic calcification of the elderly
 - Fusion of the commissure in the congenital bicuspid
- Complications/Presentation
 - Concentric LVH
 - SCD, Angina, Syncope, CHF

Cardiology



LV OutFlow Obstruction:
Aortic Stenosis
(Coming Soon - HCM)

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