



VALVULAR HEART DISEASE

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ADVANCED HEART FAILURE & TRANSPLANT

Learning Objectives

- Recognize the pathophysiology and presentation of multiple valvular lesions, and select appropriate testing.
- Briefly discuss the indications for interventions for each lesion.

Valvular Regurgitation

- Mitral Regurgitation
 - Acute
 - Chronic
- Aortic Regurgitation
 - Acute
 - Chronic
- Tricuspid Regurgitation

A 74yo gentleman presents with abrupt dyspnea and orthopnea

- Hypotensive
- Tachycardic
- Rales
- Soft or no murmur
- TTE: hyperdynamic LV with mild MR



Acute Severe Mitral Regurgitation

A clinical syndrome

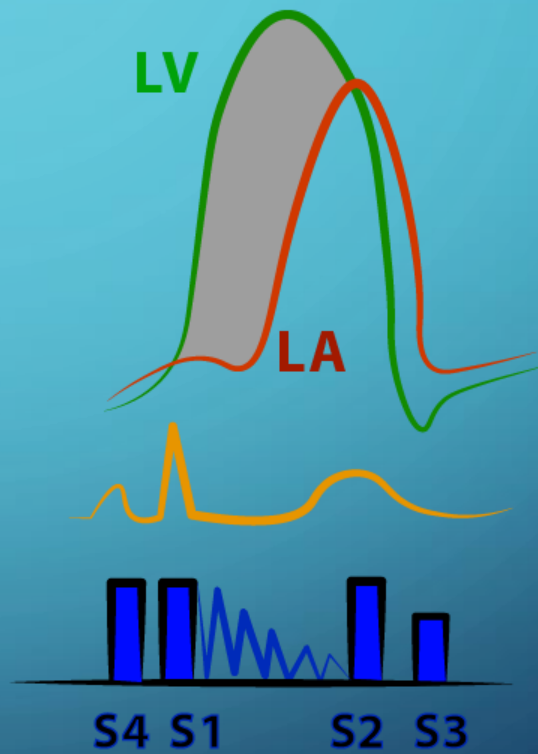
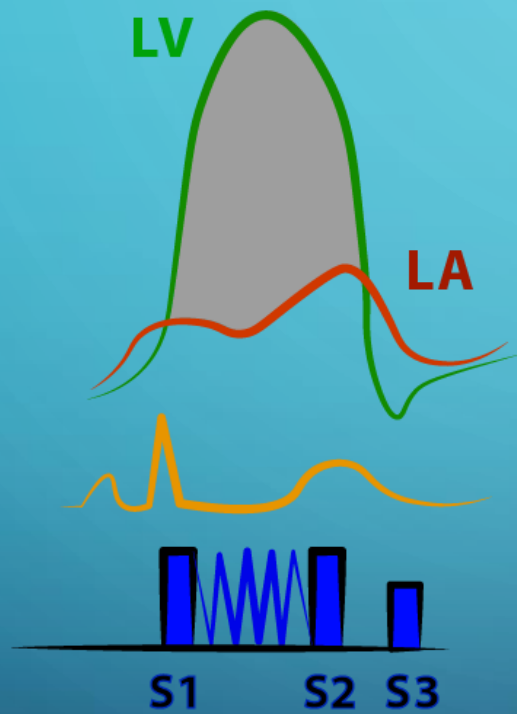
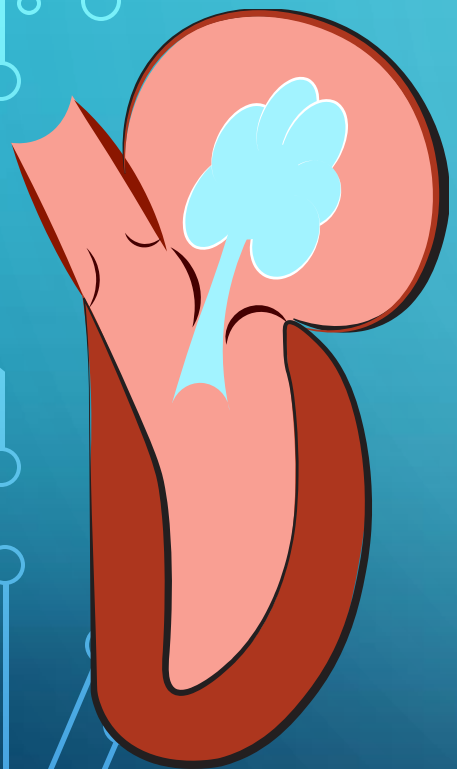
- Etiology
 - Chordal rupture
 - Infective endocarditis
 - Ischemic heart disease
- Pulmonary congestion/edema
- S3 and S4
- MR murmur may be soft, short or absent

Acute Severe Mitral Regurgitation

A clinical syndrome

- Etiology (if TTE is negative, get TEE)
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- MR murmur may be soft, short or absent

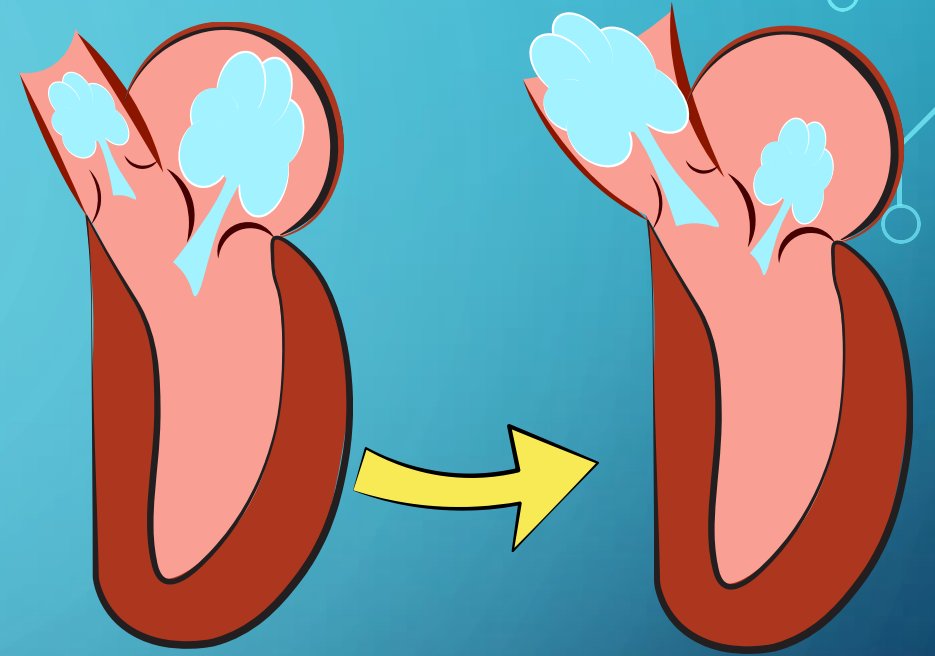
Hemodynamics of MR



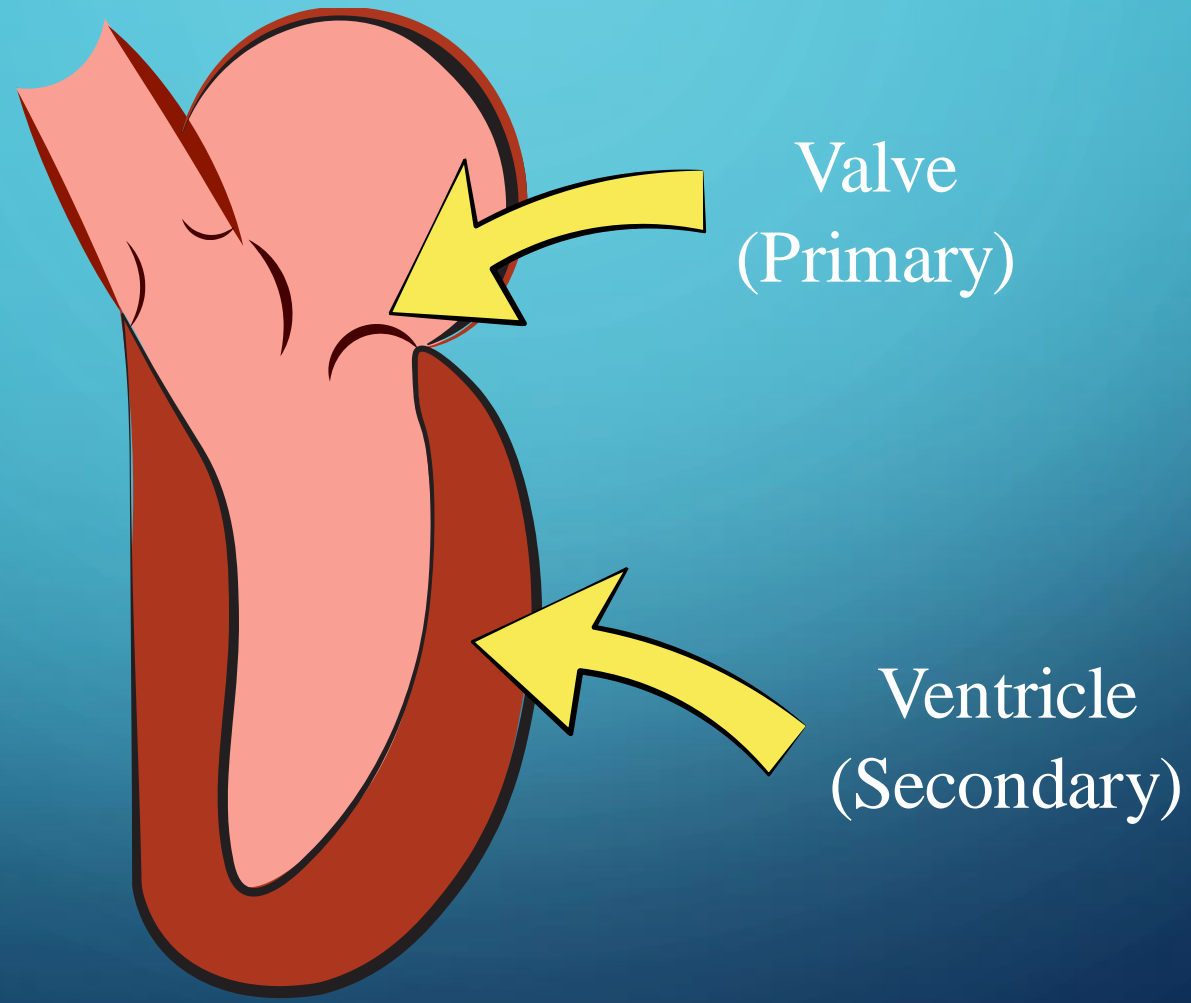
Acute Severe Mitral Regurgitation

Treatment

- Treat with afterload reduction (vasodilators, IABP)
- Surgery – dictated by etiology
 - Papillary muscle rupture, dehiscenced mitral prosthesis: operate NOW
 - Endocarditis: operate if heart failure
 - Chordal rupture: depends on response to therapy

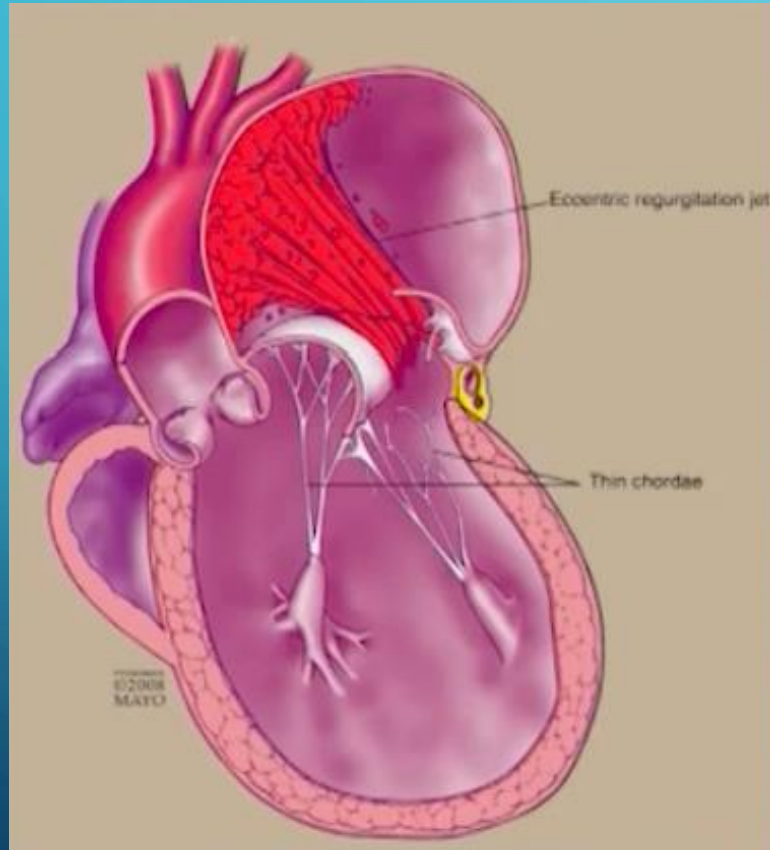


Chronic Mitral Regurgitation

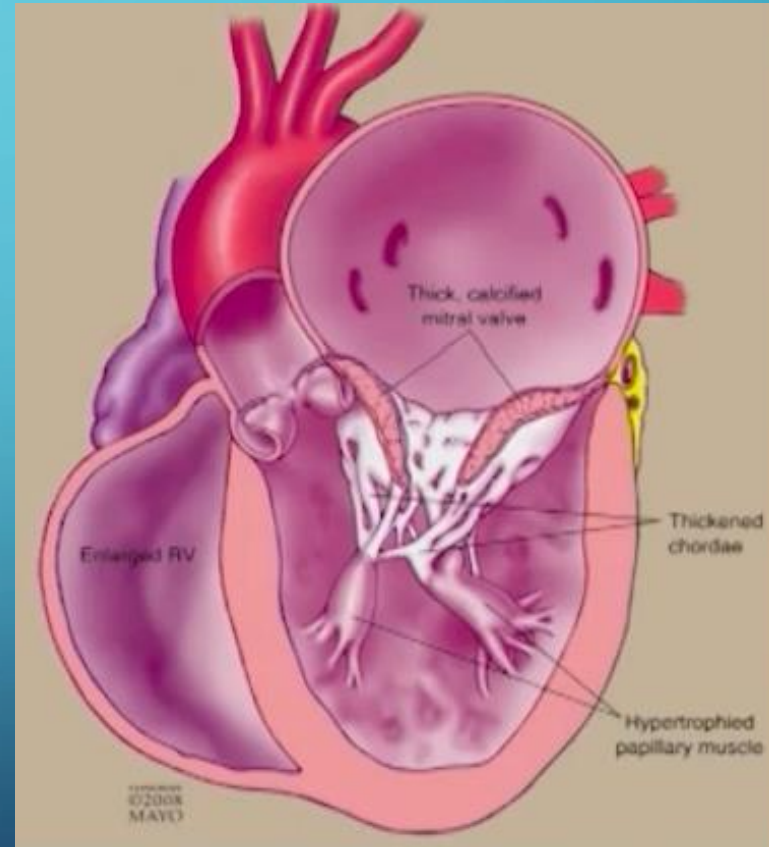


Primary Chronic MR

Degenerative

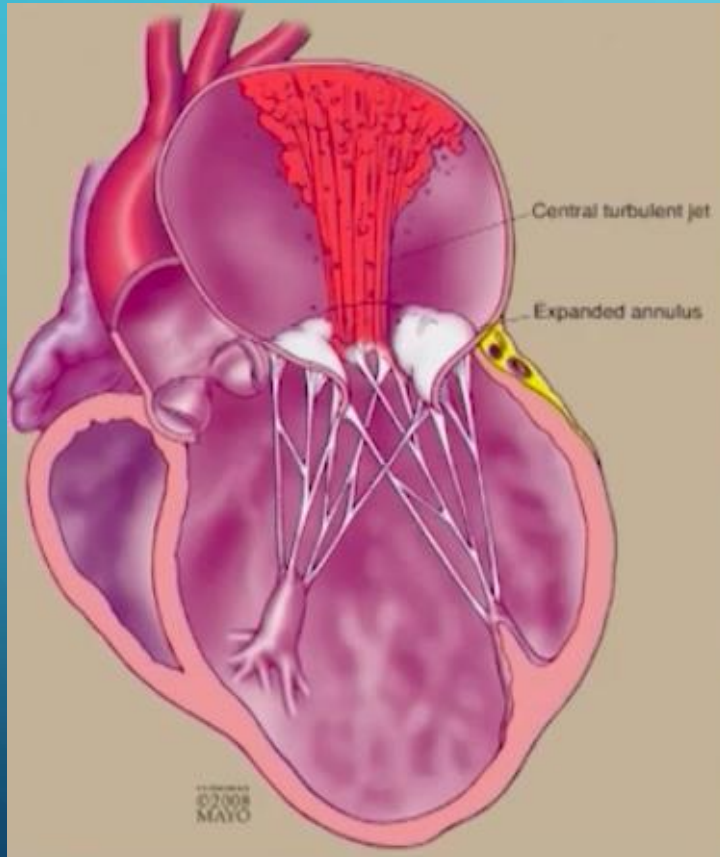


Rheumatic

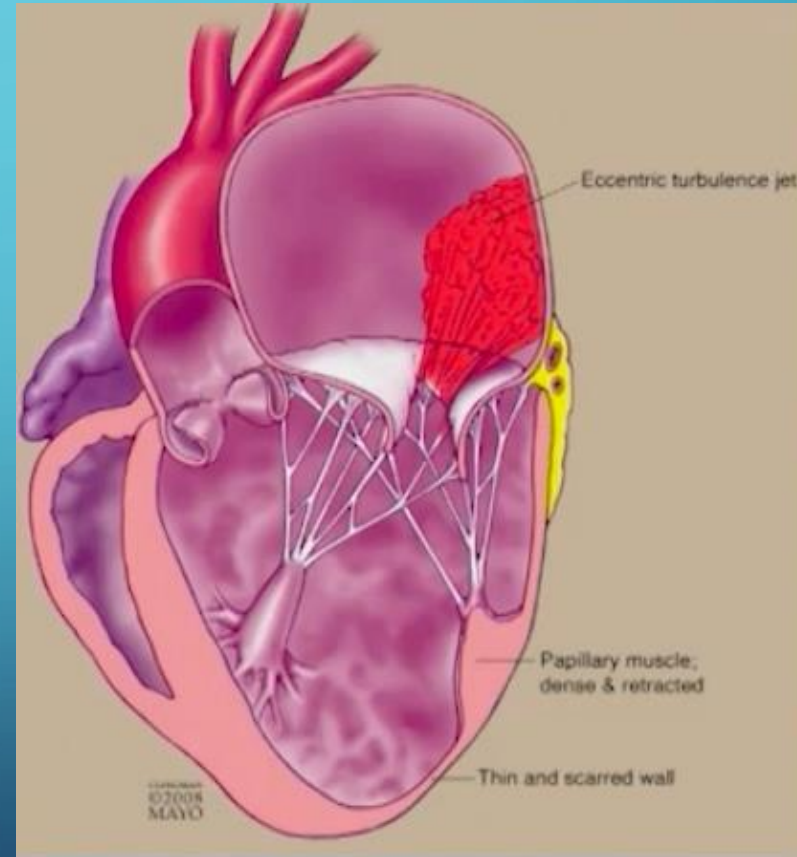


Secondary Chronic MR

Dilated

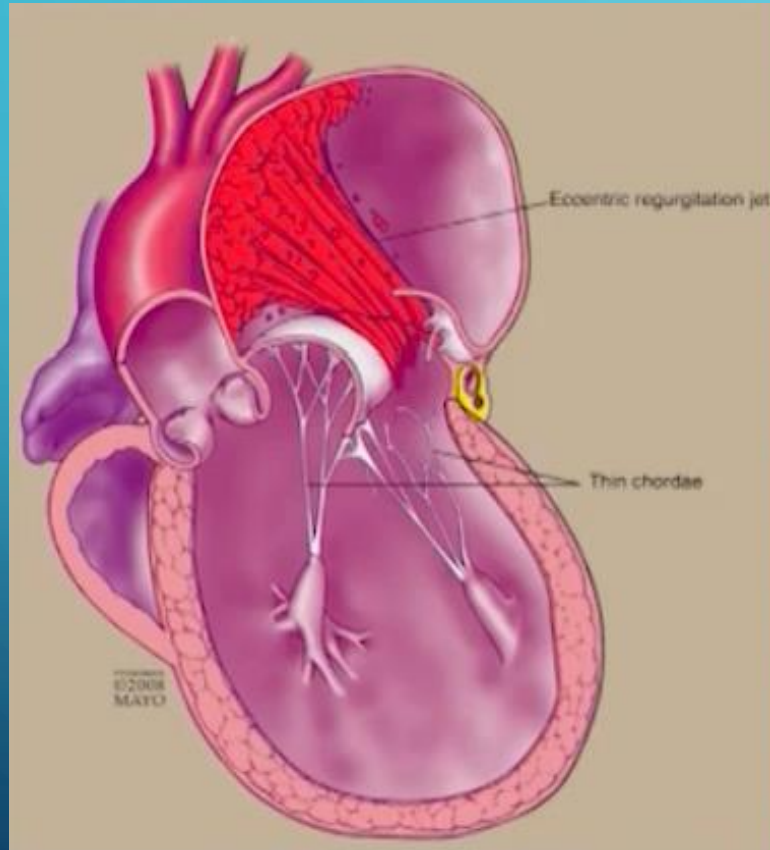


Ischemic

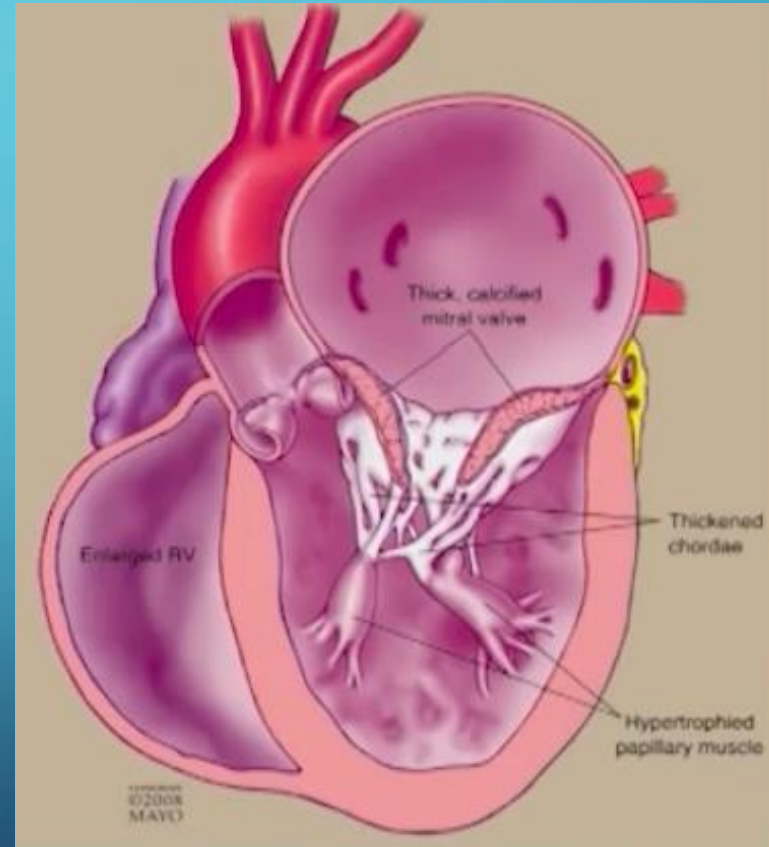


Primary Chronic MR

Degenerative

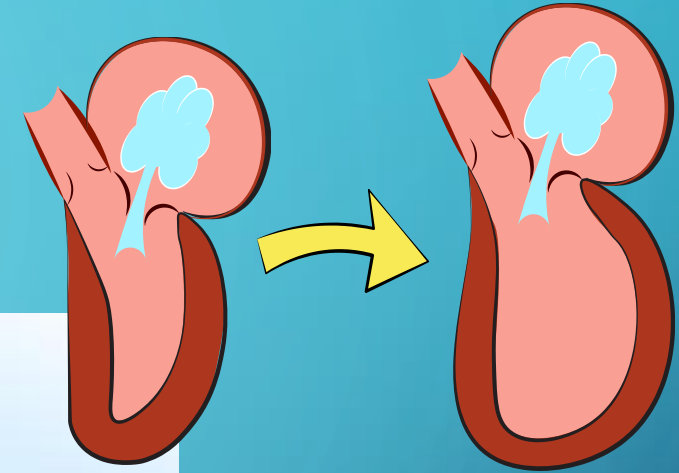


Rheumatic

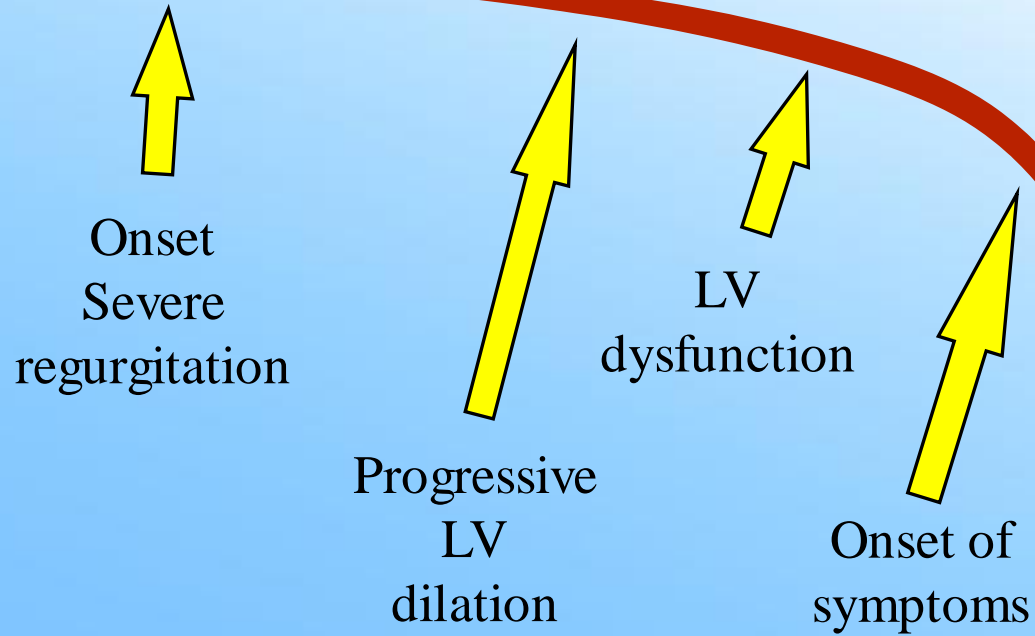


Regurgitant Lesions

Concept of volume overload



Survival

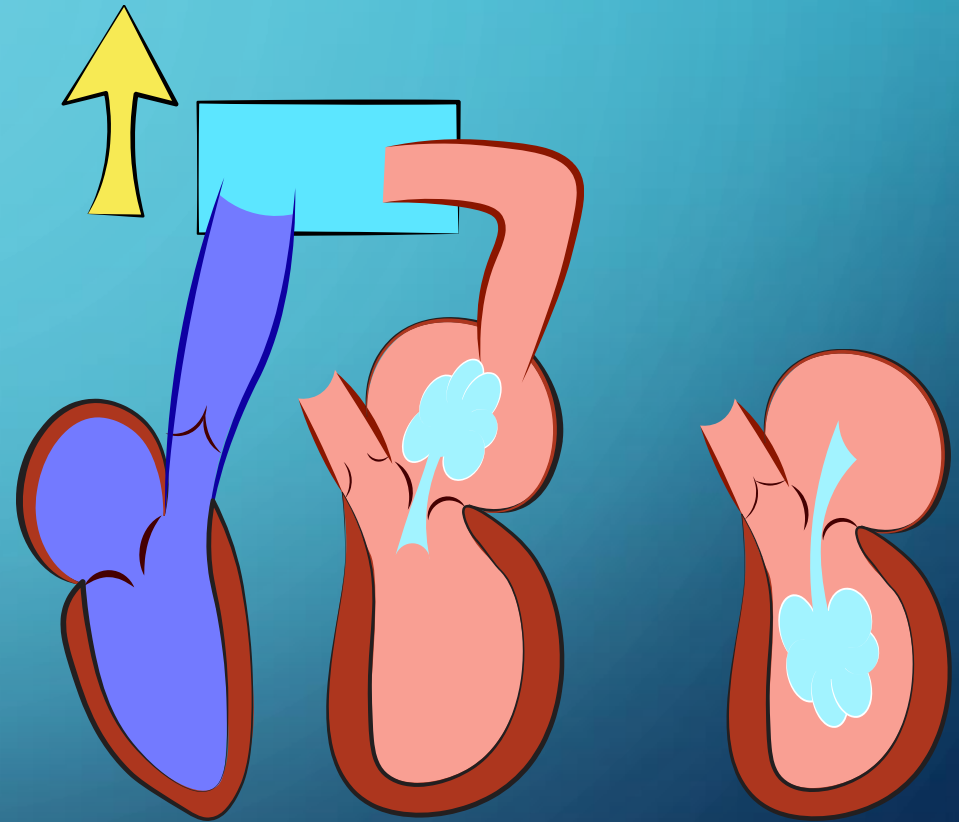
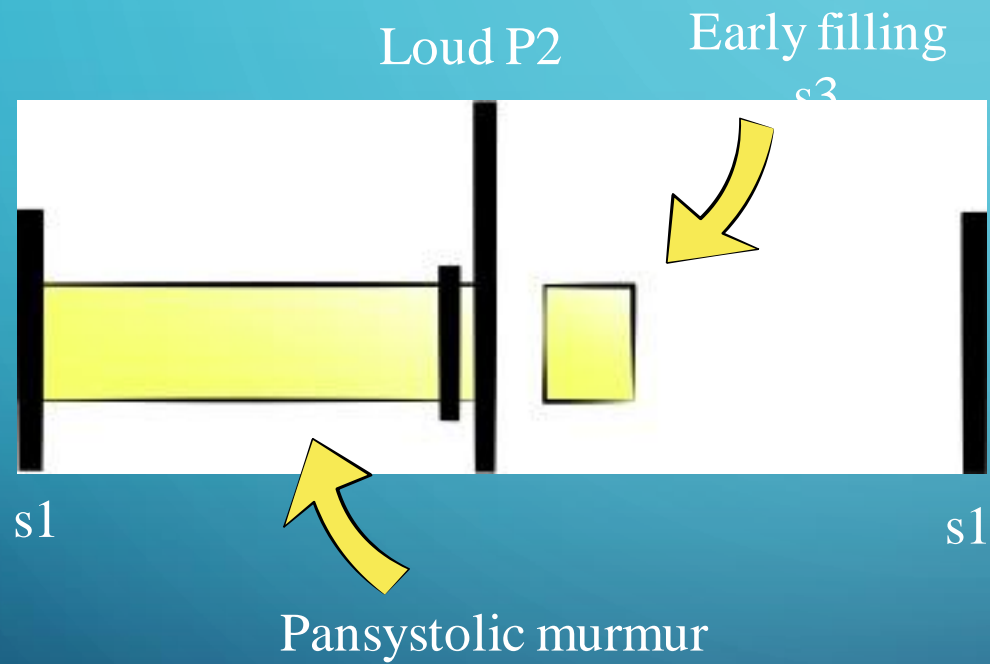


- Prolonged asymptomatic period
- Low output, pulmonary congestion

Years

Chronic MR

Physical Examination



Chronic MR

How to assess?



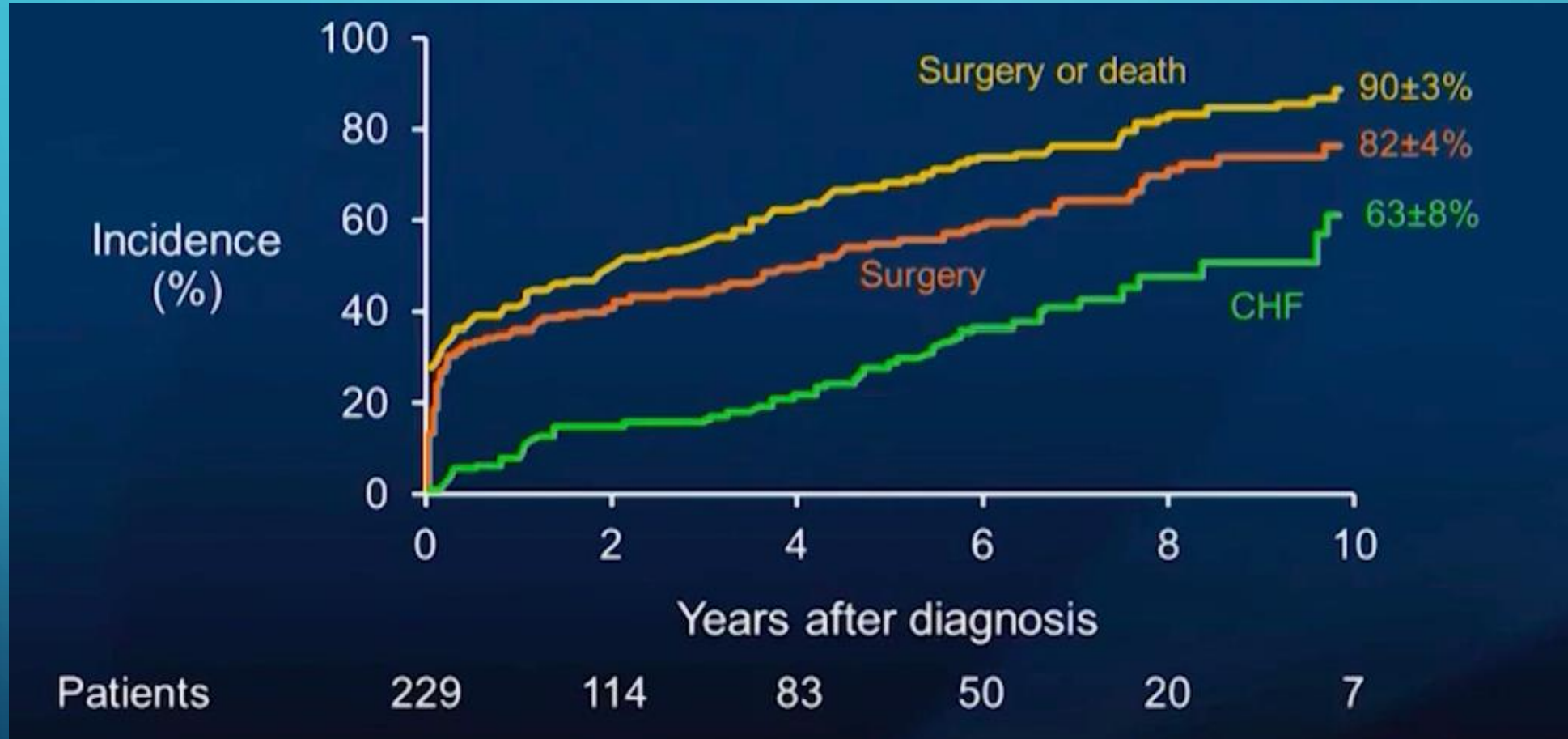
Chronic MR

Echocardiography

- The severity of the regurgitation
- The etiology (flail leaflets, degenerative disease, secondary MR, MVP)
- Evaluation of anatomy for intervention

Chronic primary MR

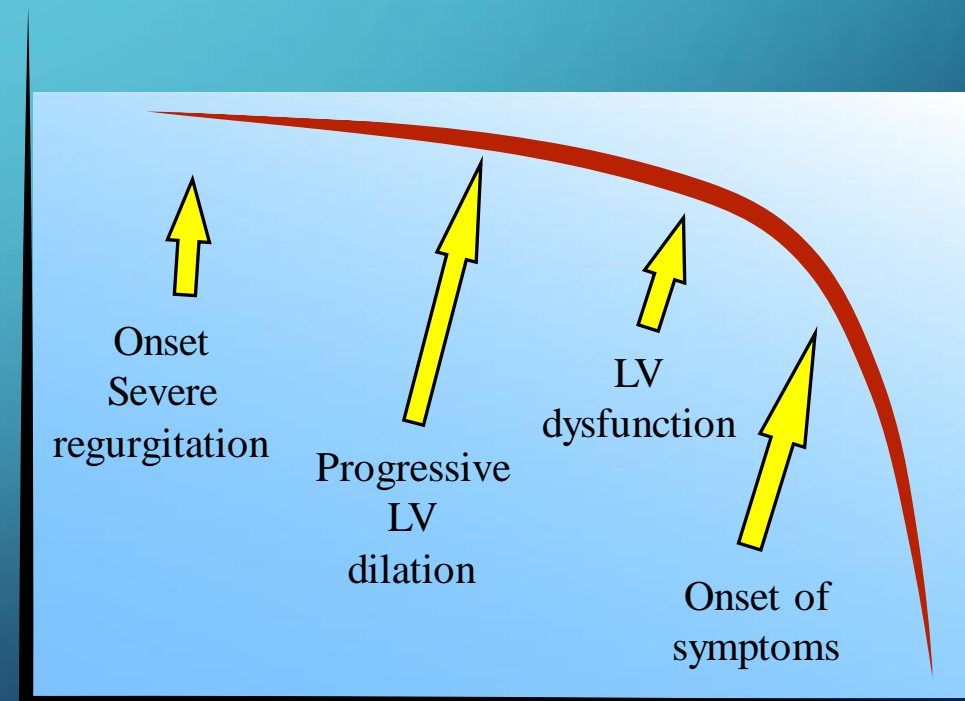
Treatment



Chronic primary MR

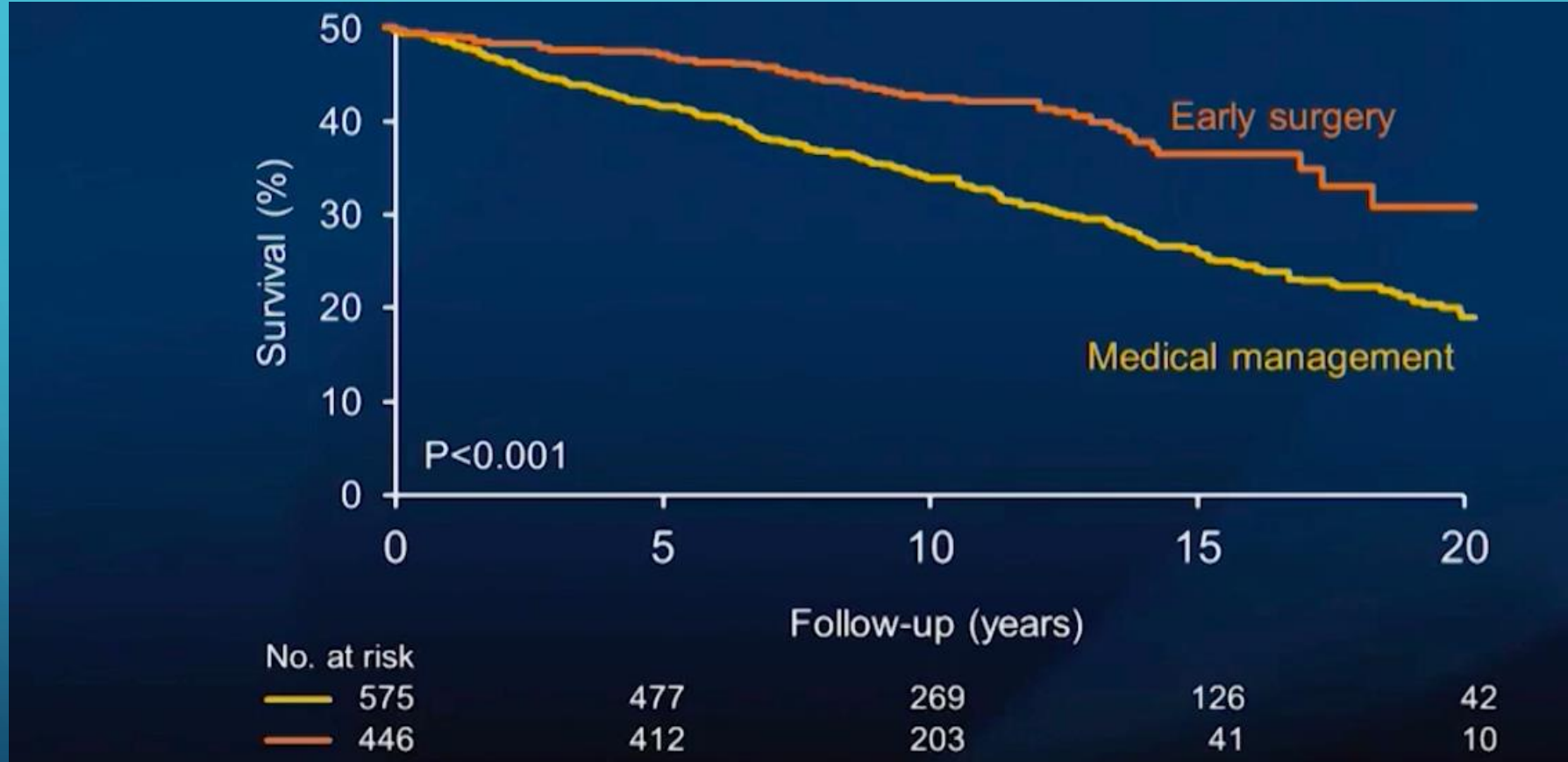
Treatment

- In the absence of systemic hypertension, **no indication** for vasodilator therapy if asymptomatic and preserved LV.
- Indications for surgery (MVR or repair):
 - Severe MR
 - Any symptoms of HF
 - LV dysfunction (EF <60%)
 - LV dilation



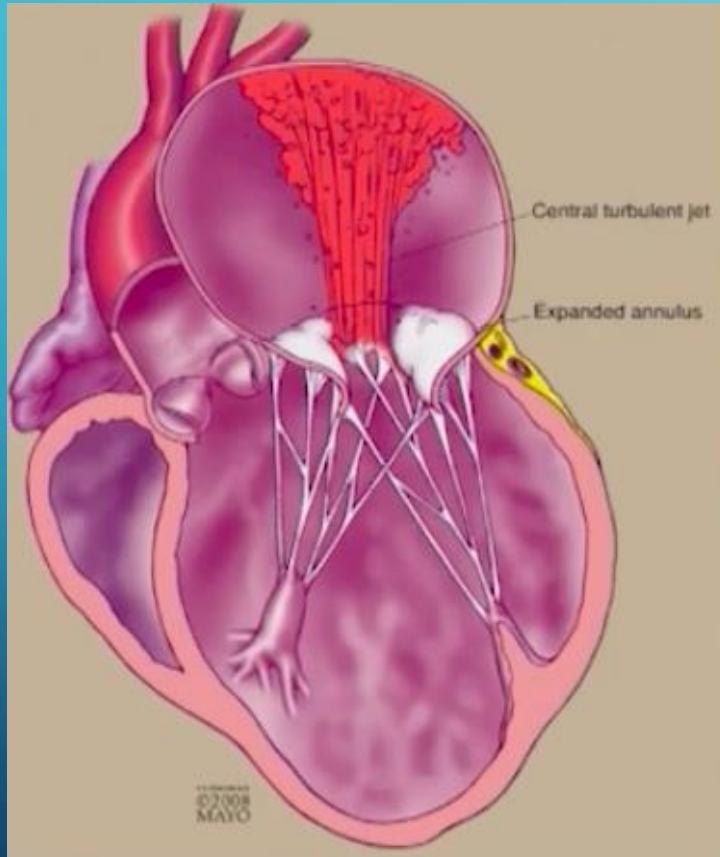
Chronic primary MR

Treatment

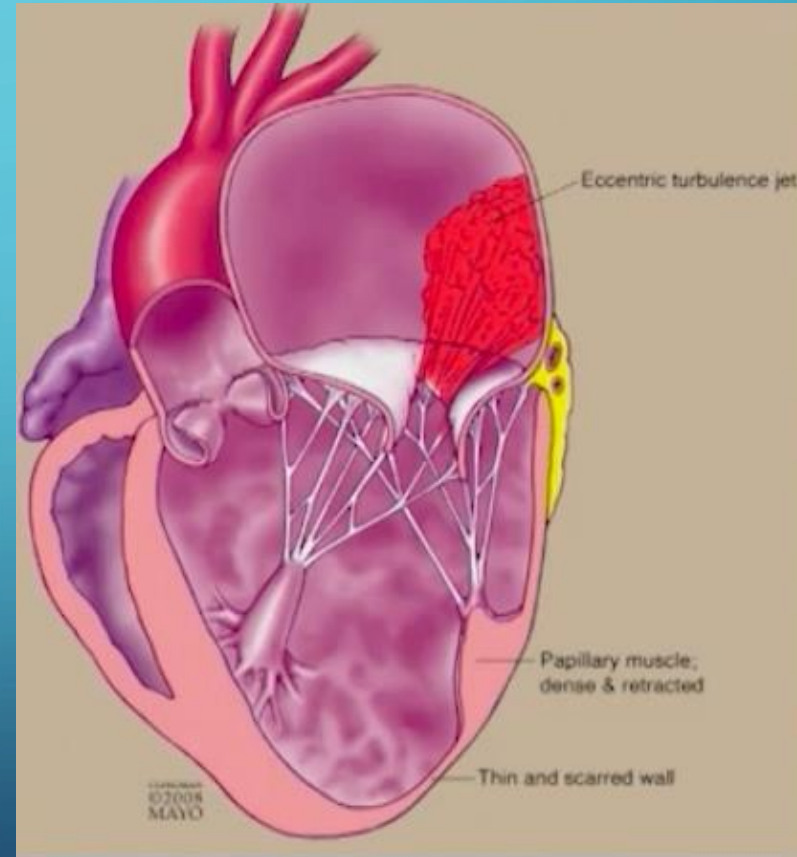


Secondary Chronic MR

Dilated



Ischemic



Chronic secondary MR

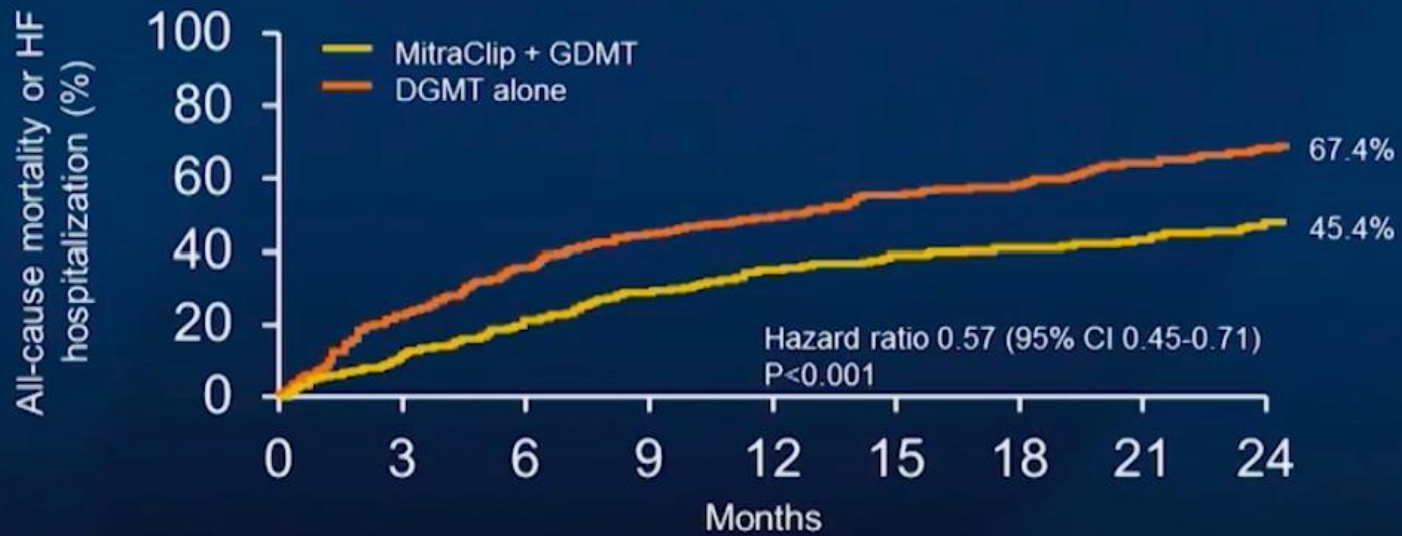
Treatment (Percutaneous Mitra-Clip)



Chronic secondary MR

Treatment

COAPT Trial



No. at risk	0	3	6	9	12	15	18	21	24
MitraClip + GDMT	302	264	238	215	194	154	145	126	97
DGMT alone	312	244	205	174	153	117	90	75	55

Chronic secondary MR

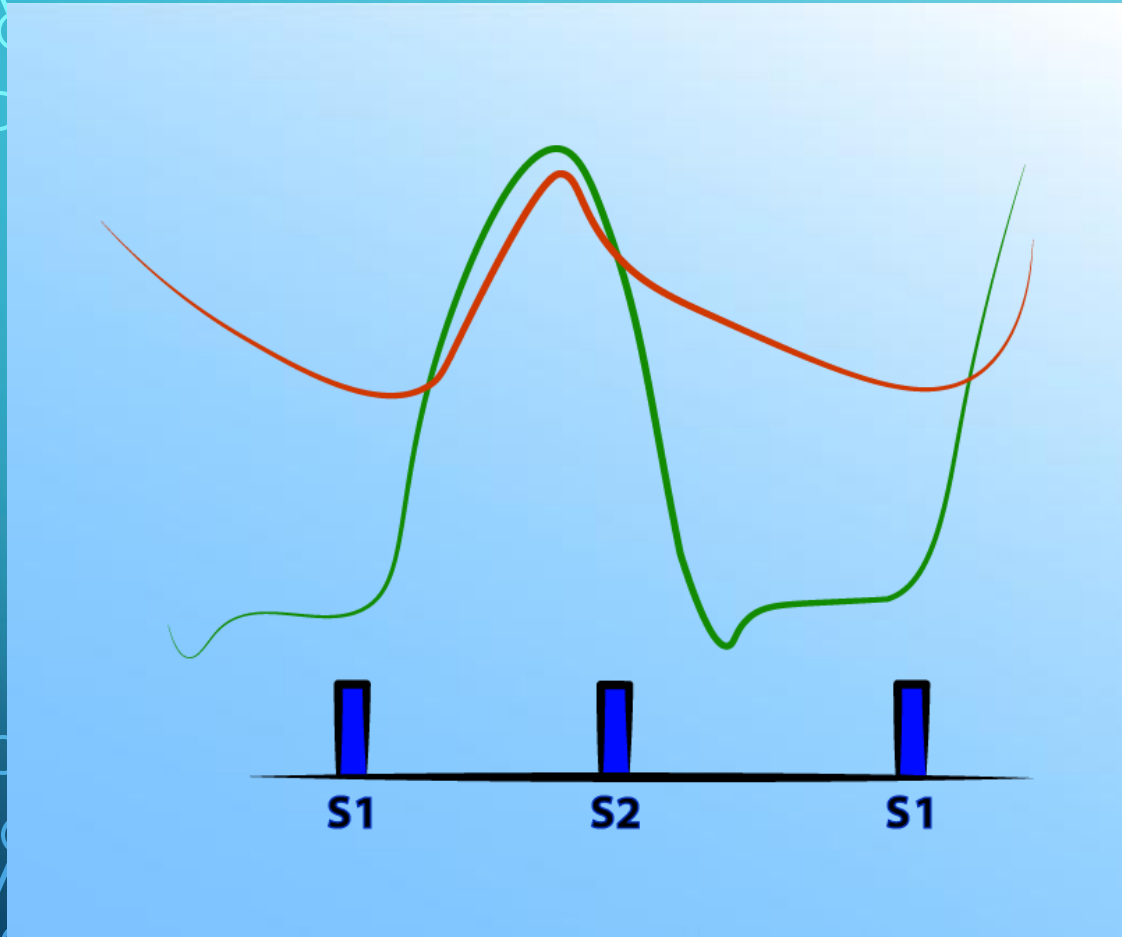
Treatment

- Treatment of chronic HF with guideline-directed medical therapy
- Treatment of ongoing ischemia if any
- If ongoing symptoms with severe MR, consider treatment with percutaneous Mitra-Clip

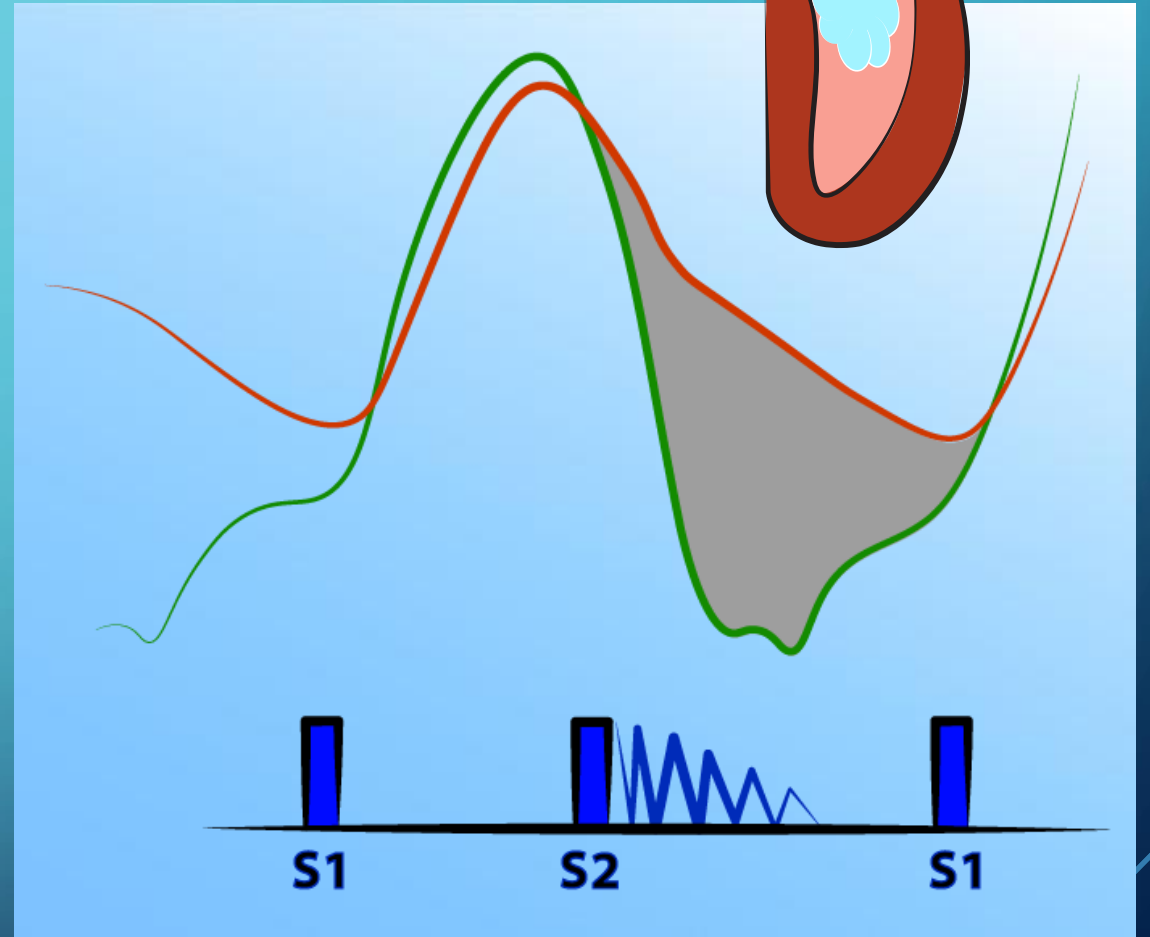
Aortic Regurgitation

- Acute aortic regurgitation
- Chronic aortic regurgitation

Acute Aortic Regurgitation



Normal Hemodynamics



Acute AR

Acute Aortic Regurgitation

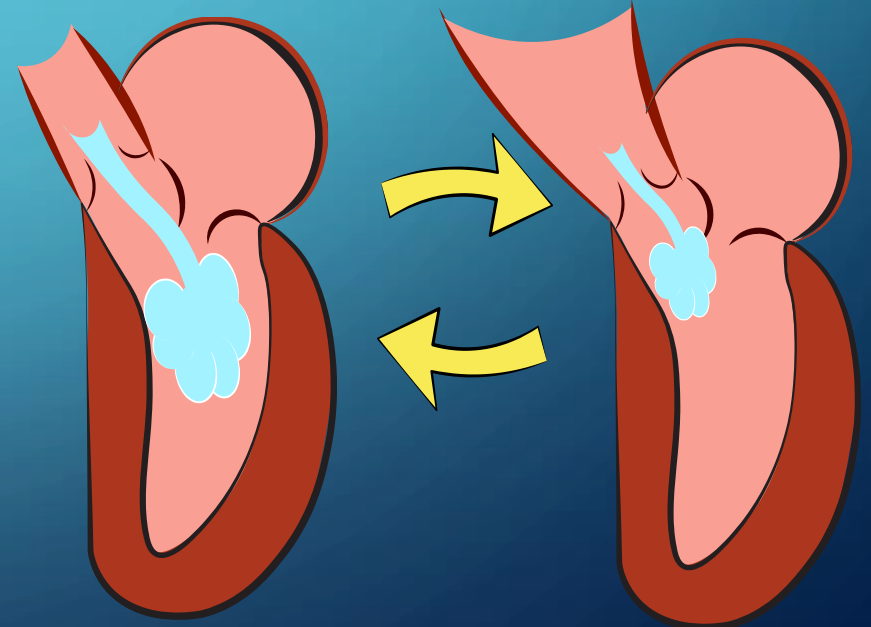
A clinical syndrome

- Etiology (if TTE is negative, get TEE)
 - Root - dissection
 - Valve - endocarditis
- Pulmonary congestion/edema
- S3 and S4
- AR murmur may be soft, short or absent
- May not have bounding pulse

Acute Severe Aortic Regurgitation

Treatment Options

- Urgent surgical intervention indicated
- Afterload enhancers **contraindicated** (pressors)
- Afterload reducers can be used
- Beta blockers **contraindicated**
- Inotropic support can be used
- May not have bounding pulse



Aortic Regurgitation

Etiologies

Intrinsic Valvular

- Degenerative/calcific
- Bicuspid
- Endocarditis
- Rheumatic fever
- Valvulitis
- Anorexia medications

Ascending Aortic

- Degenerative
- Type A dissection
- Marfan syndrome
- Inflammatory
- Giant cell arteritis

Aortic Regurgitation

Physical examination

- The most consistent exam finding: wide pulse pressure
- Head nodding (de Musset's)
- Capillary pulsation (Quincke's)
- Rapid carotid upstroke, rapid collapse (Corrigan's pulse)
- "Pistol Shot" femoral (Duroziez's)

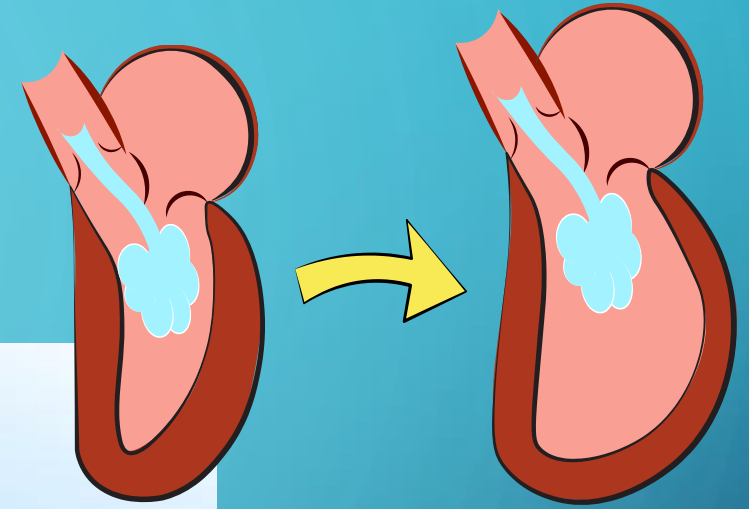


Aortic Regurgitation Diagnosis

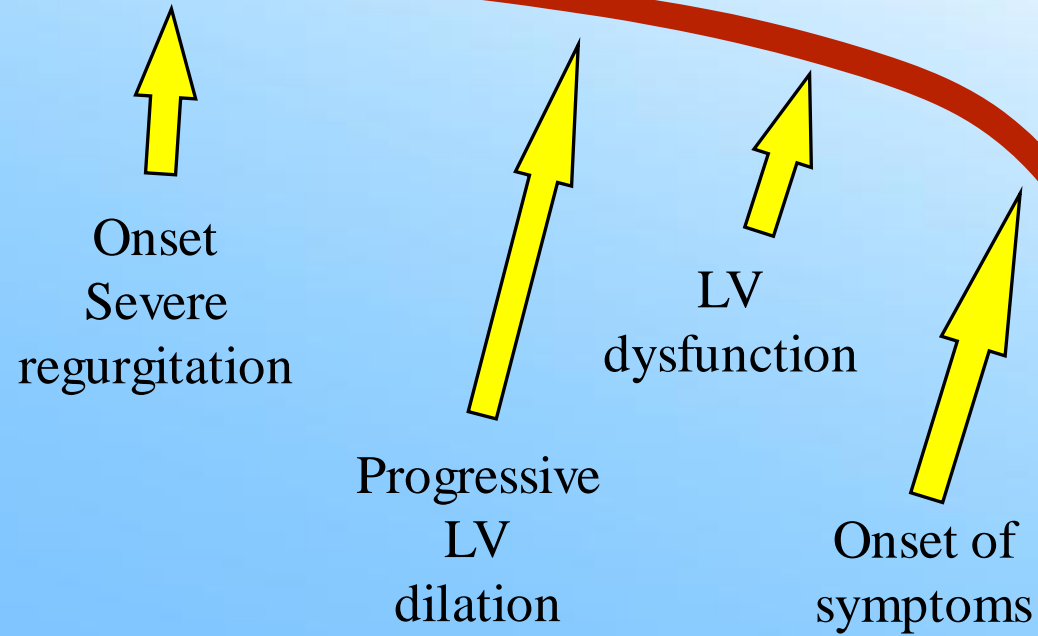


Chronic Aortic Regurgitation

Concept of volume and pressure overload



Survival

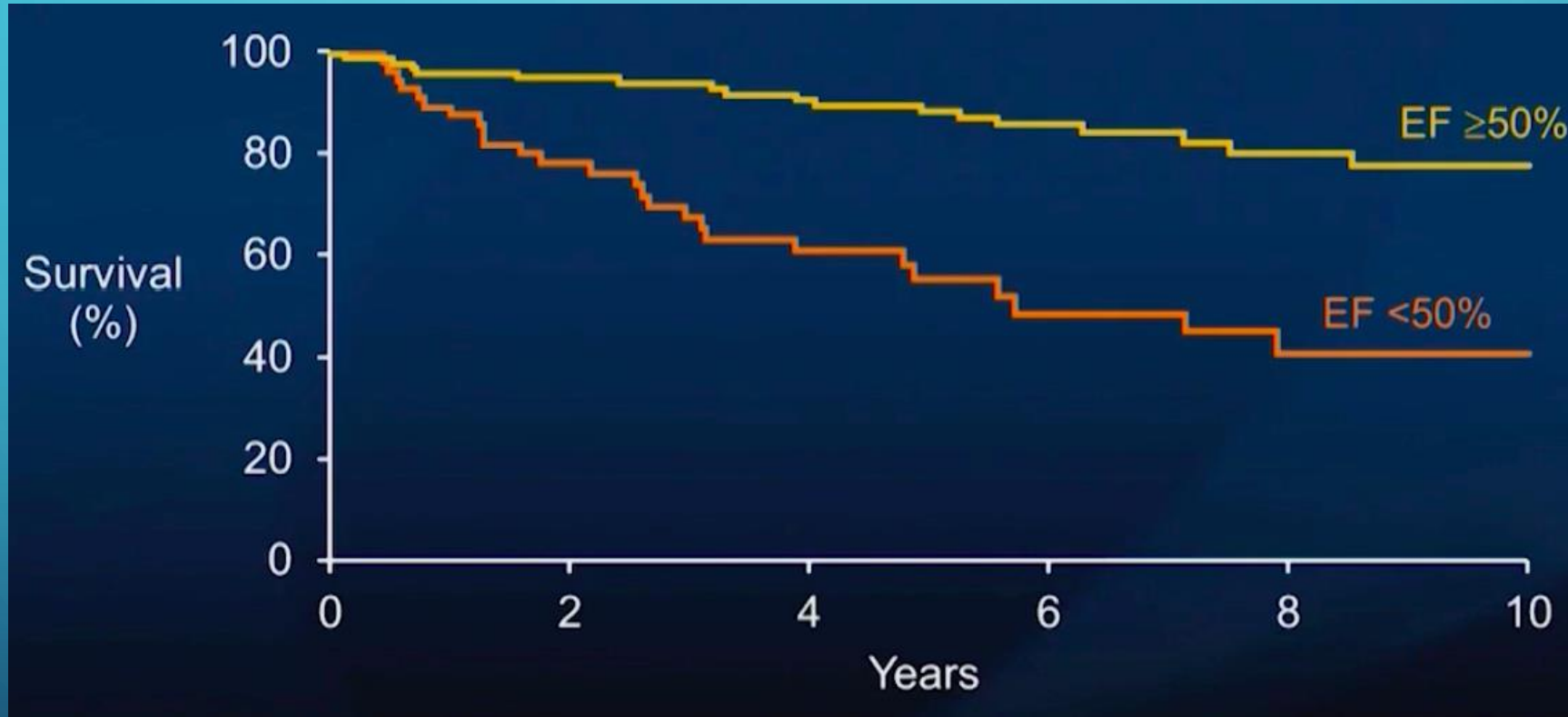


Years

- Prolonged asymptomatic period
- Low output, pulmonary congestion

Chronic Aortic Regurgitation

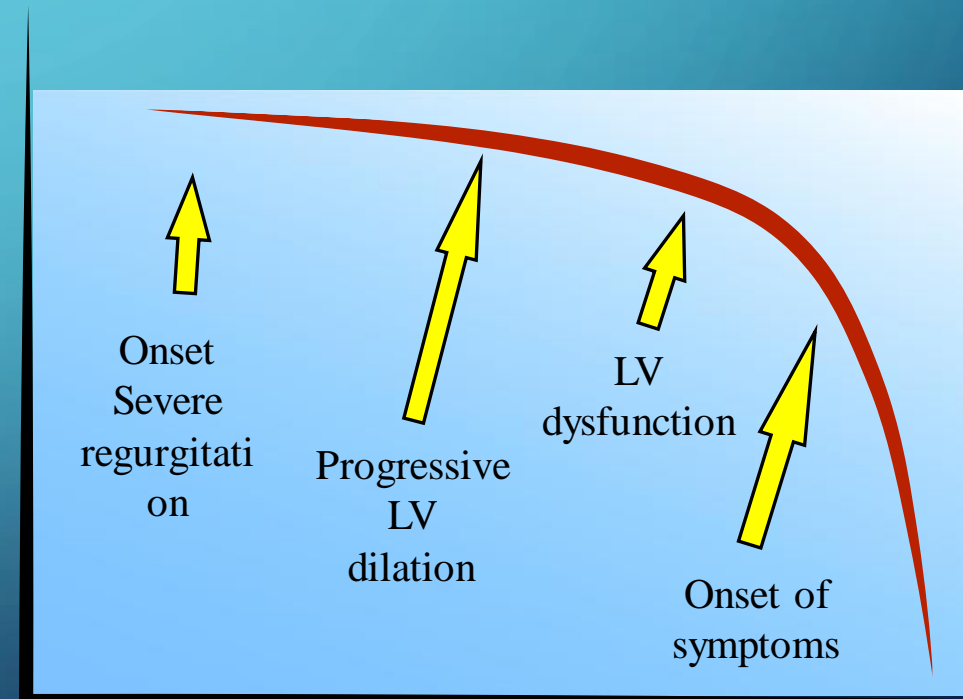
Natural History: LV function



Chronic severe aortic regurgitation

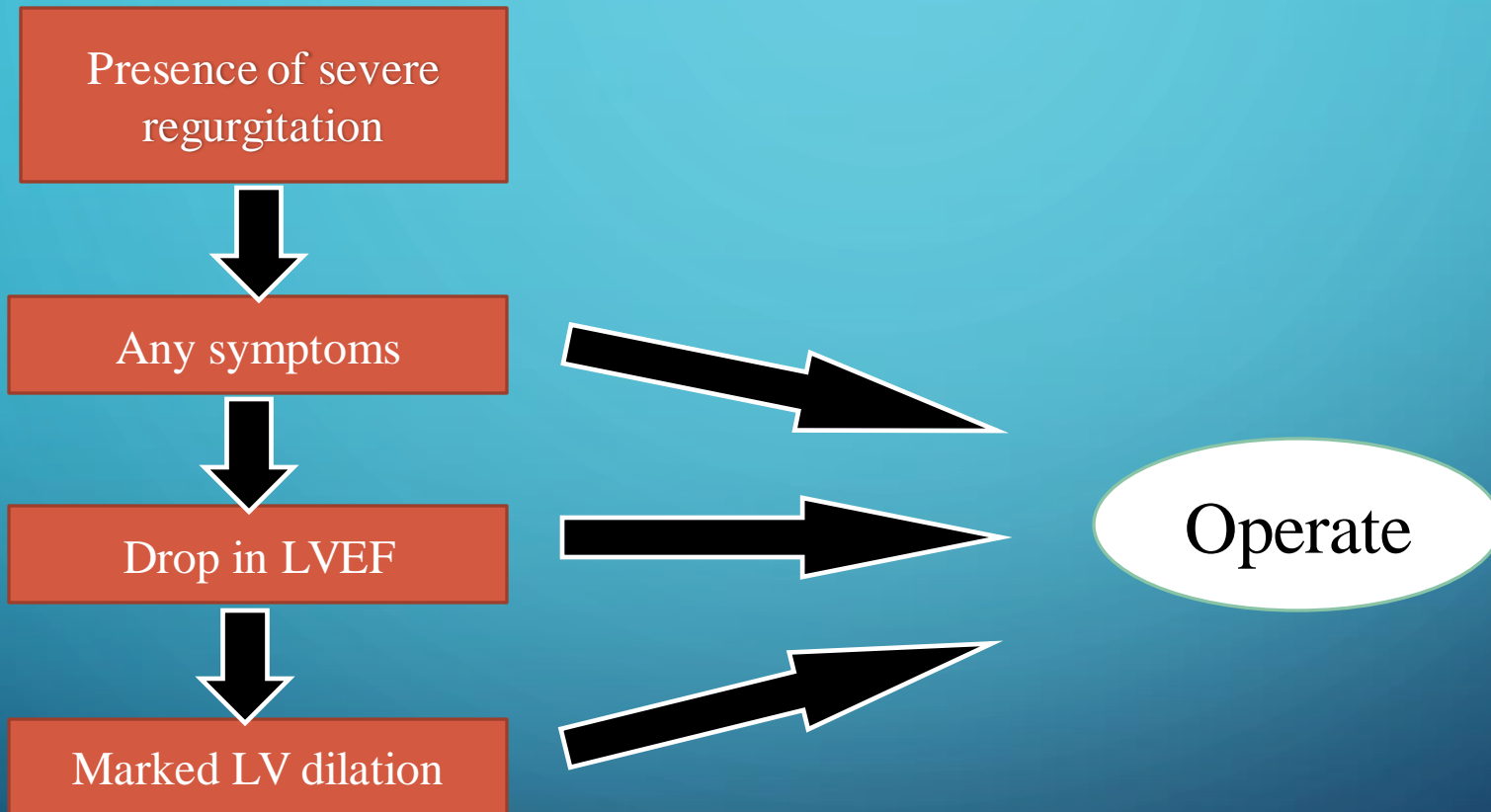
Treatment

- In the absence of systemic hypertension, **no indication** for vasodilator therapy if asymptomatic and preserved LV.
- Indications for surgery (AVR):
 - Severe AR
 - Any symptoms of HF
 - LV dysfunction (EF <50%)
 - LV dilation



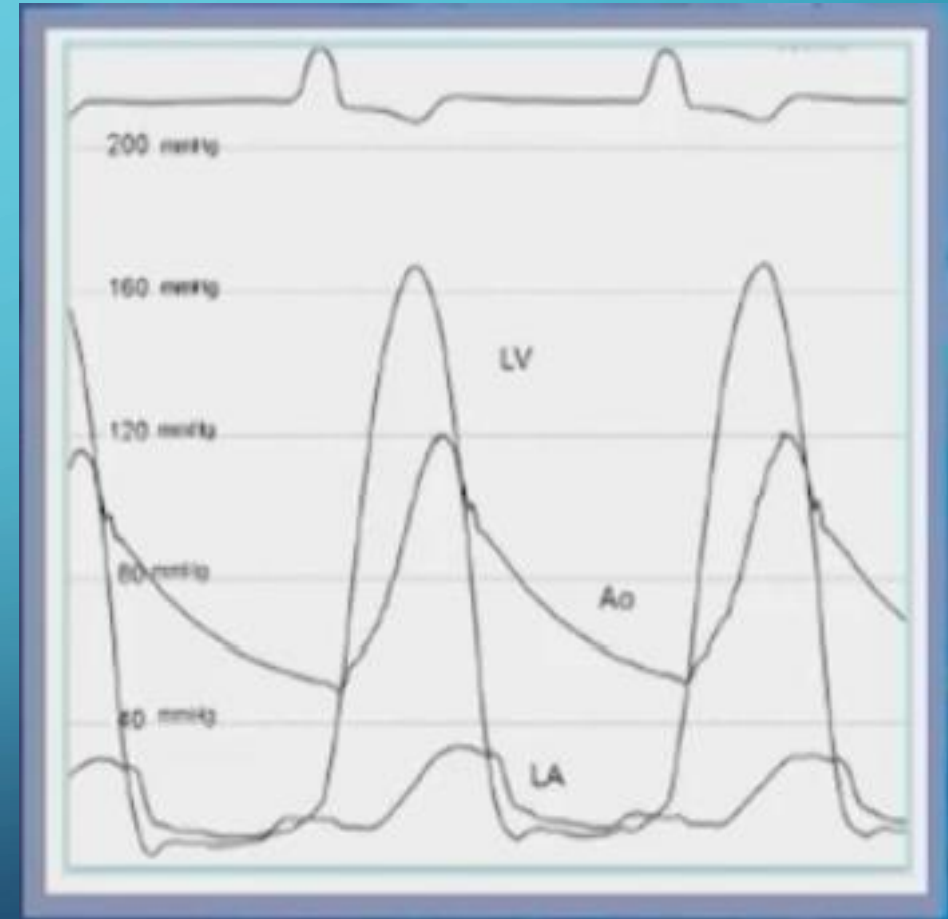
Valvular Regurgitation

Indications for operation



In this patient with a systolic murmur and $EF = 62\%$, what is the major pathophysiologic abnormality?

1. Increased wall stress, increased preload
2. Decreased afterload, decreased preload
3. Decreased wall stress, increased preload
4. Increased afterload, normal preload



Aortic Stenosis

Locations

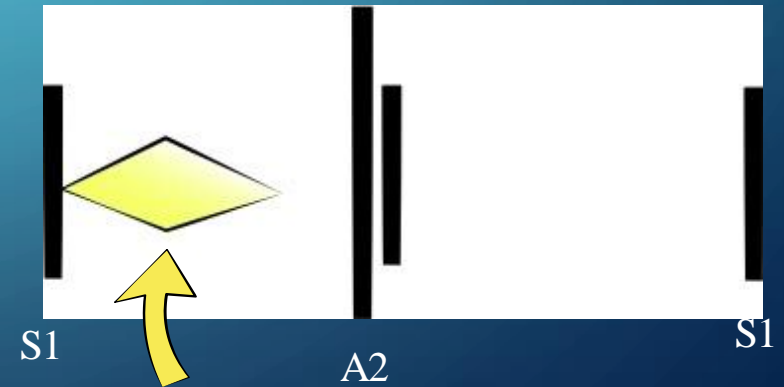
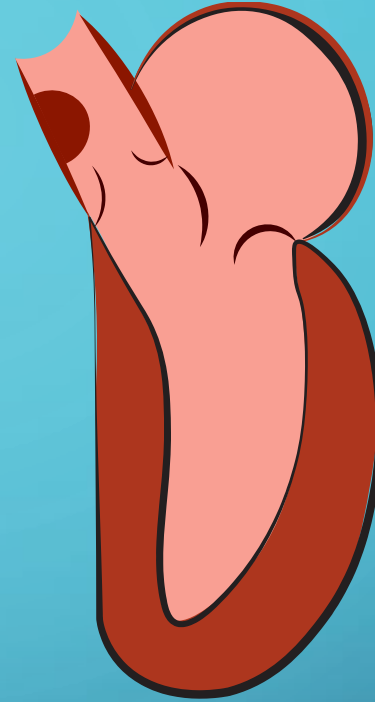
- Supravalvular
- Subvalvular
- Valvular



Aortic Stenosis

Supravalvular stenosis

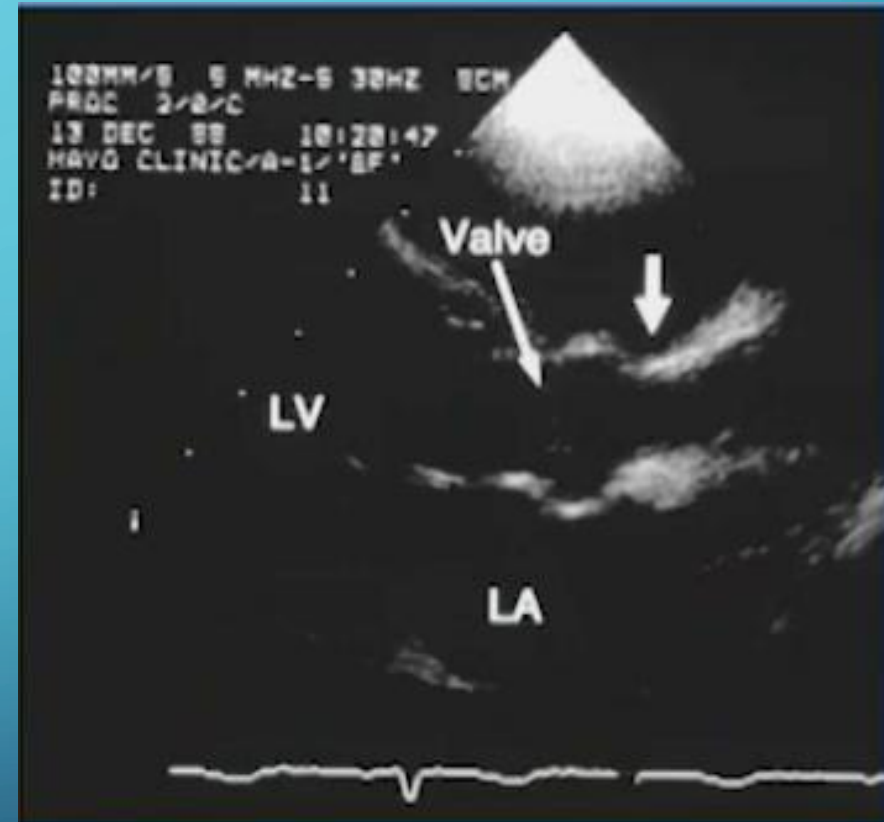
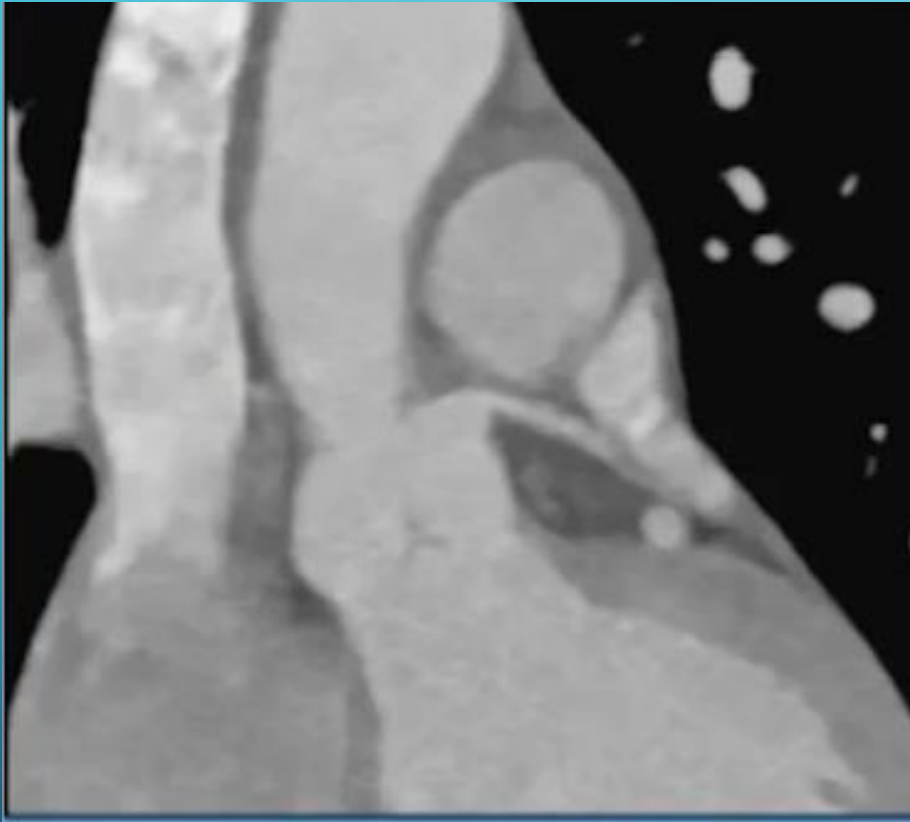
- Level of obstruction: Aorta
 - Single discrete narrowing
 - Long tubular hypoplasia
- Physical Examination
 - Thrill in suprasternal notch or R carotid
 - Loud A2
 - Systolic murmur over the aortic area



Systolic murmur

Aortic Stenosis

Supravalvular stenosis



Surgical treatment: may need conduit if severe

Aortic Stenosis

Subvalvular stenosis

- Seen in 10% of patients with AS
 - Discrete ridge
 - Tunnel stenosis
 - Frequently accompanied by AR due to jet on aortic valve



Aortic Stenosis

Subvalvular stenosis

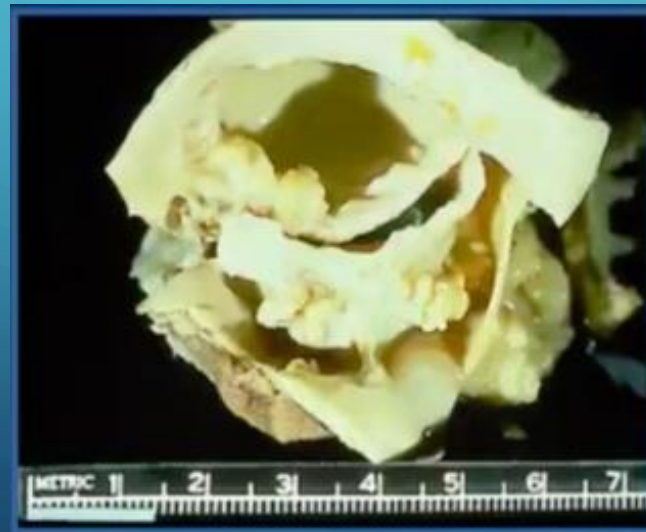
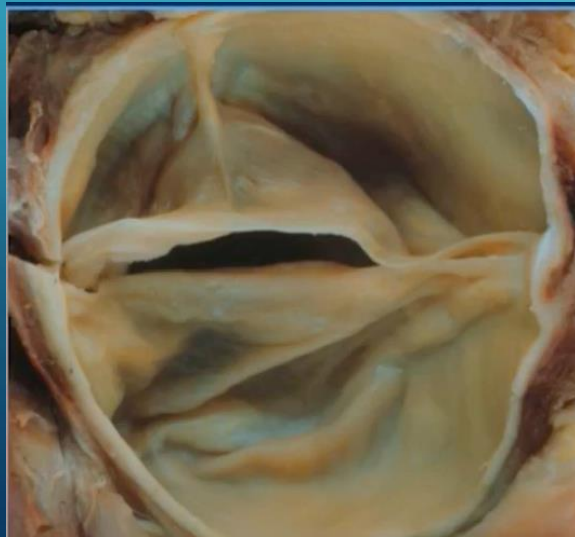
- **Diagnosis**
 - Echocardiography (TTE or TEE)
- **Treatment**
 - Surgical resection especially if severe or there is AR progression



Aortic Stenosis

valvular stenosis

- Age related
 - <30: congenital (unicuspid, bicuspid)
 - 40-60: calcified bicuspid
 - 40-60: rheumatic
 - >70: senile degenerative (the most common of all)

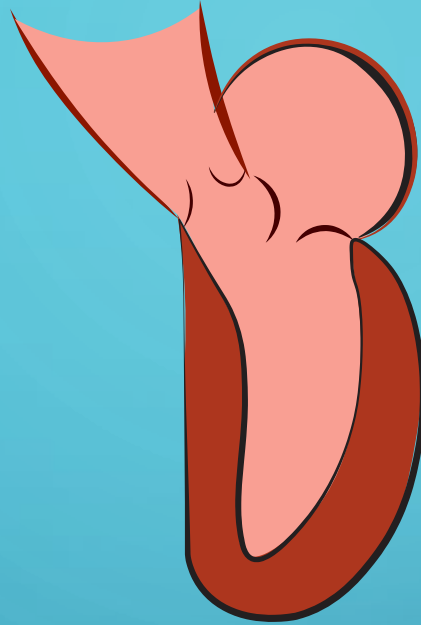


Aortic Stenosis

Bicuspid Valve



Bicuspid Valve



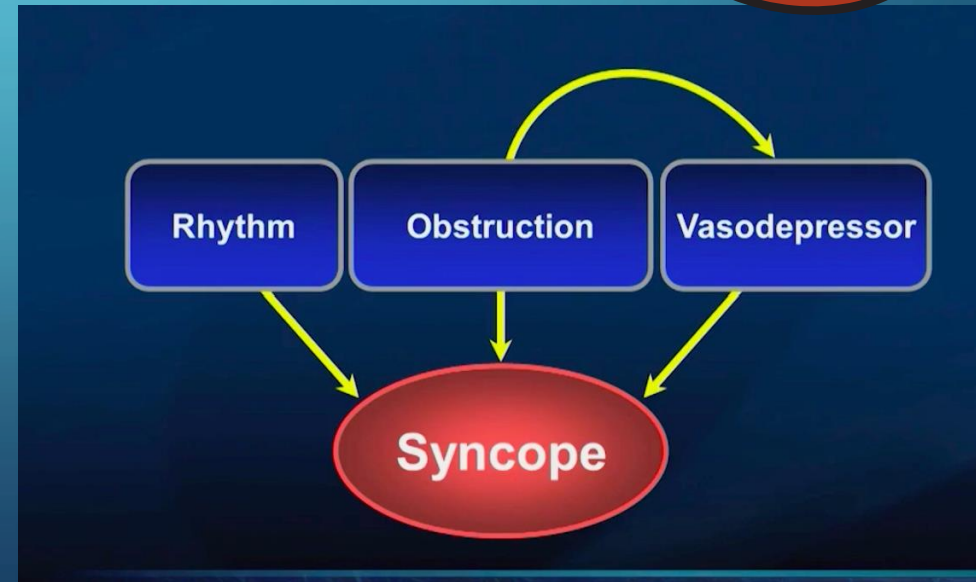
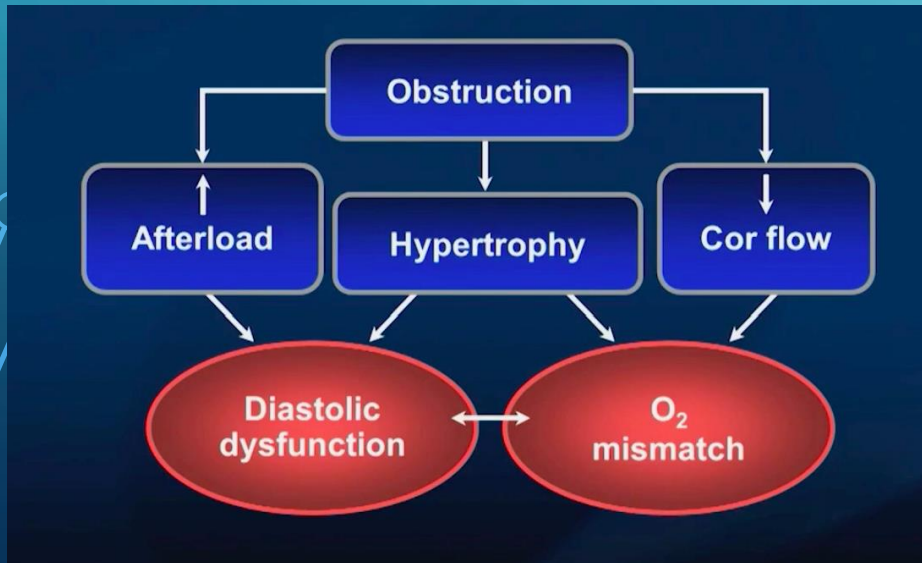
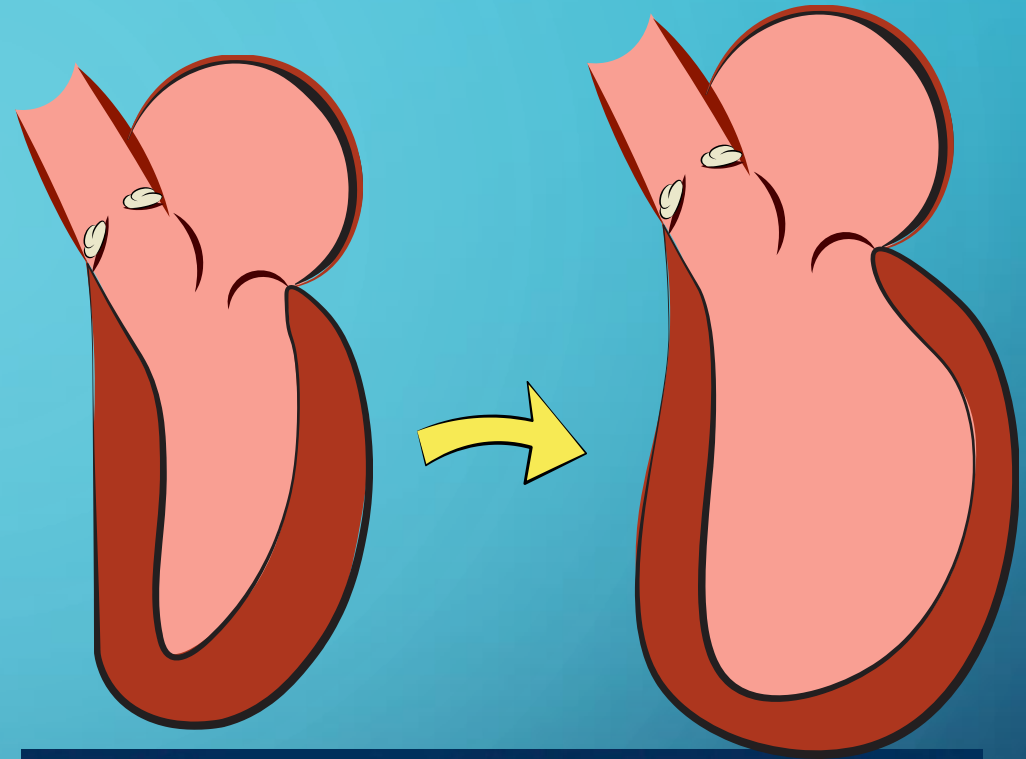
Aortic Medial Changes

- Screen first degree relatives
- Scan entire aorta

Aortic Stenosis

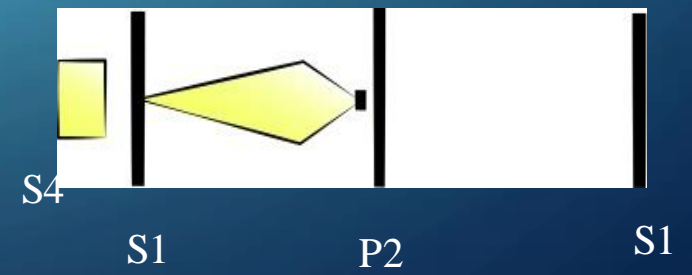
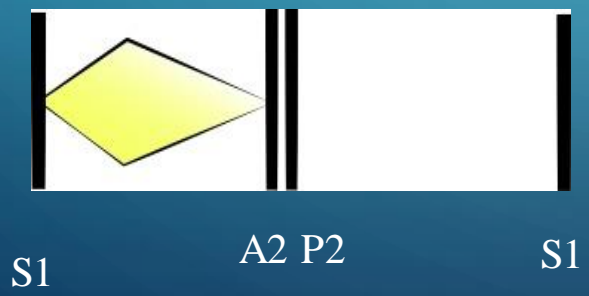
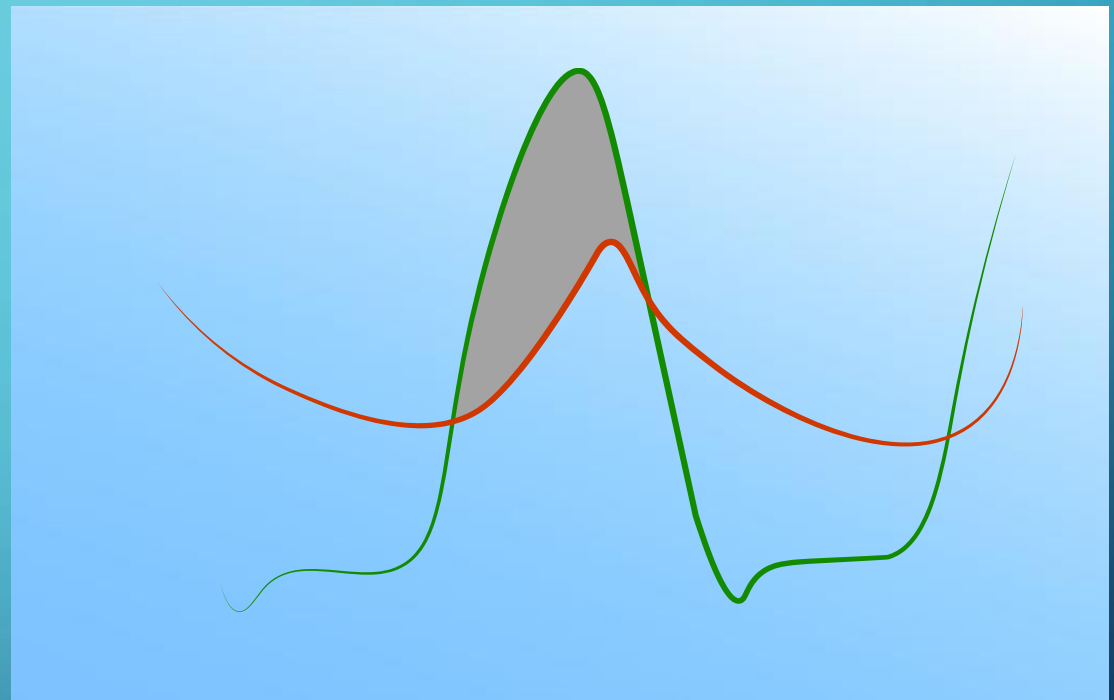
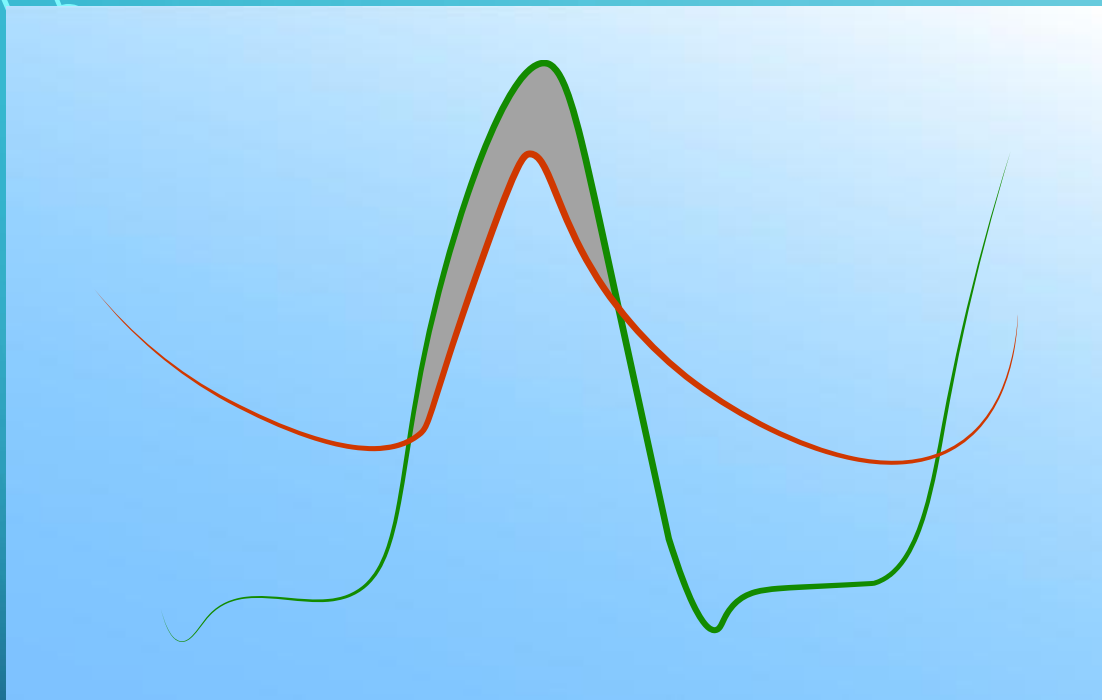
Hemodynamics

- The law of Laplace
 - $T = r * p / 2h$
- Initial normalization of stress
- End-stage, regression of LVEF
- Symptoms:
 - Dyspnea, angina, syncope



Aortic Stenosis

Physical Examination

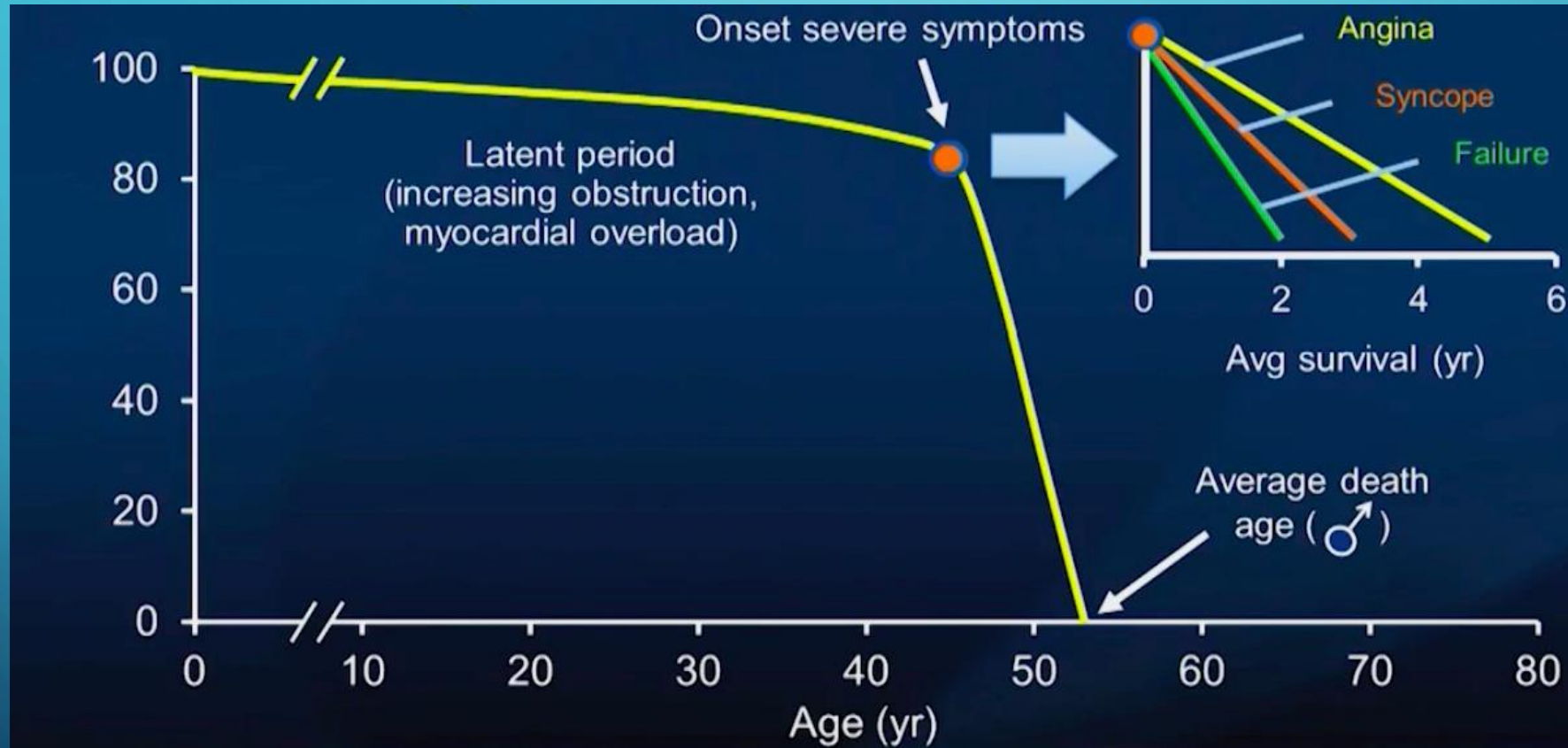


Aortic Stenosis Diagnosis



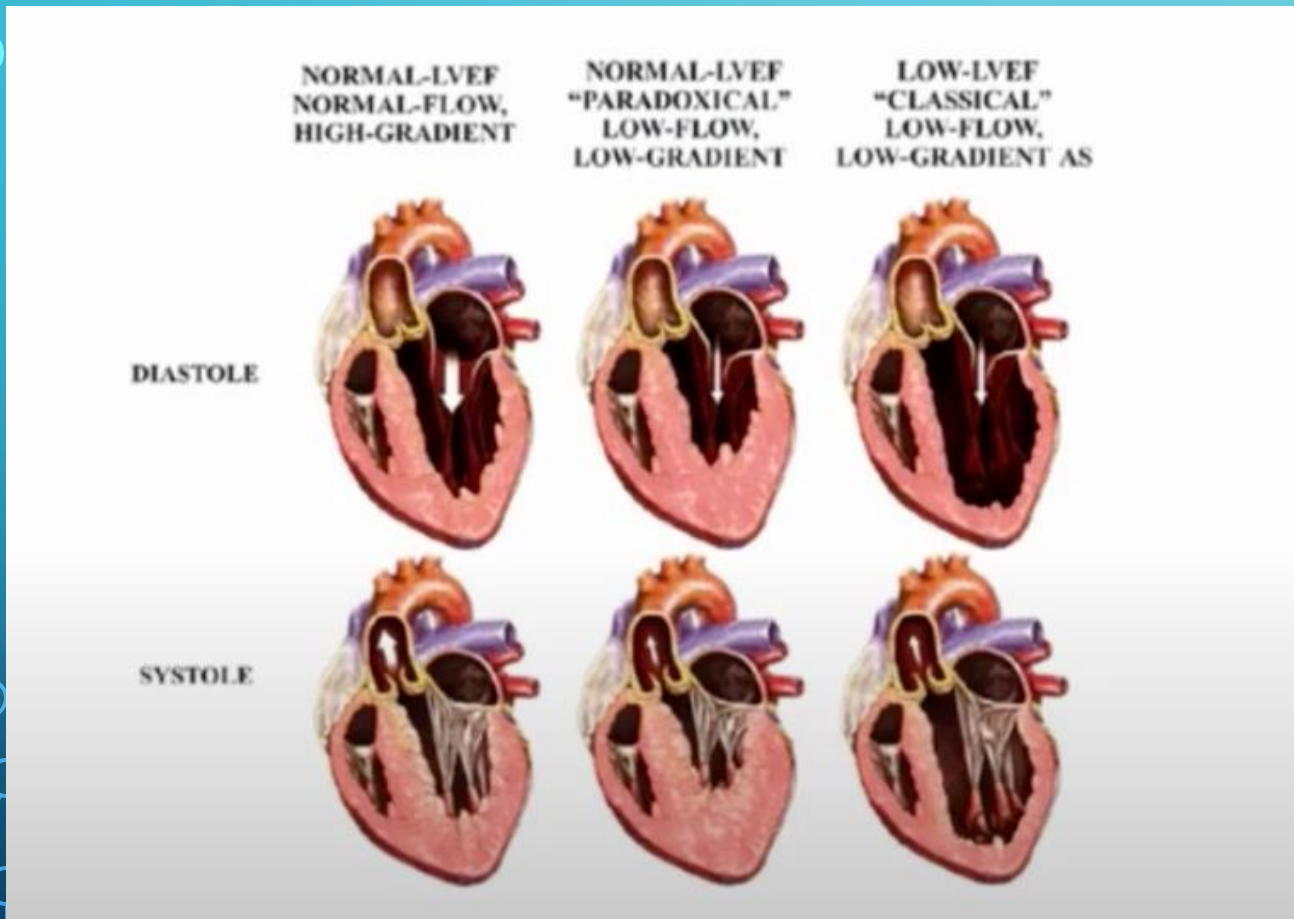
Aortic Stenosis

Natural History



Aortic Stenosis

Diagnosis

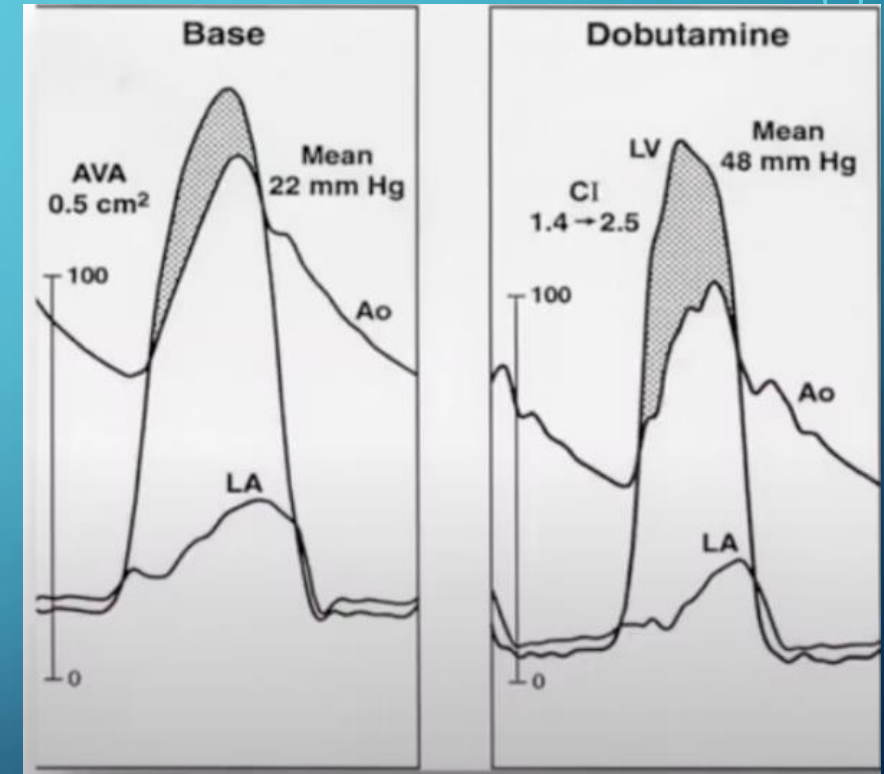
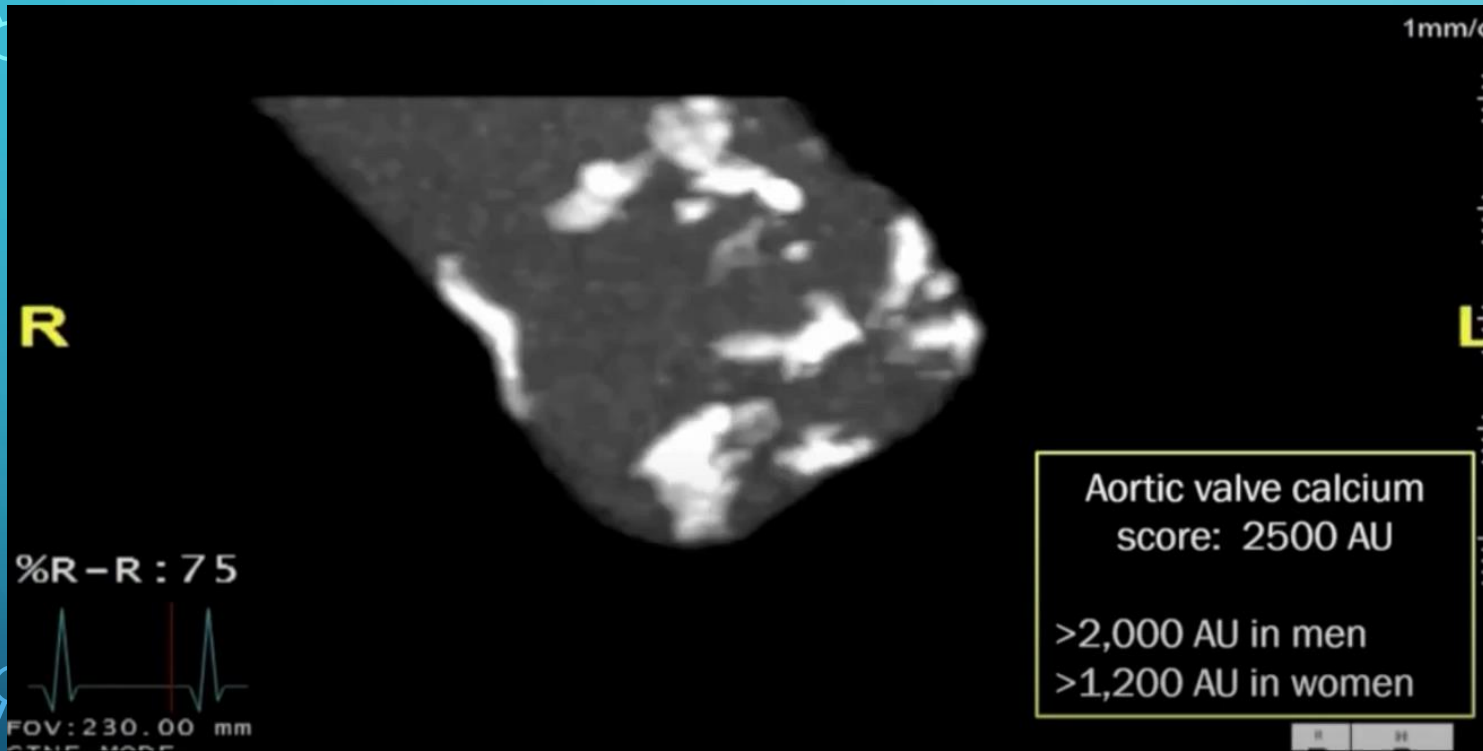


Exam findings \neq echo findings

→ Further testing

Aortic Stenosis

Diagnosis



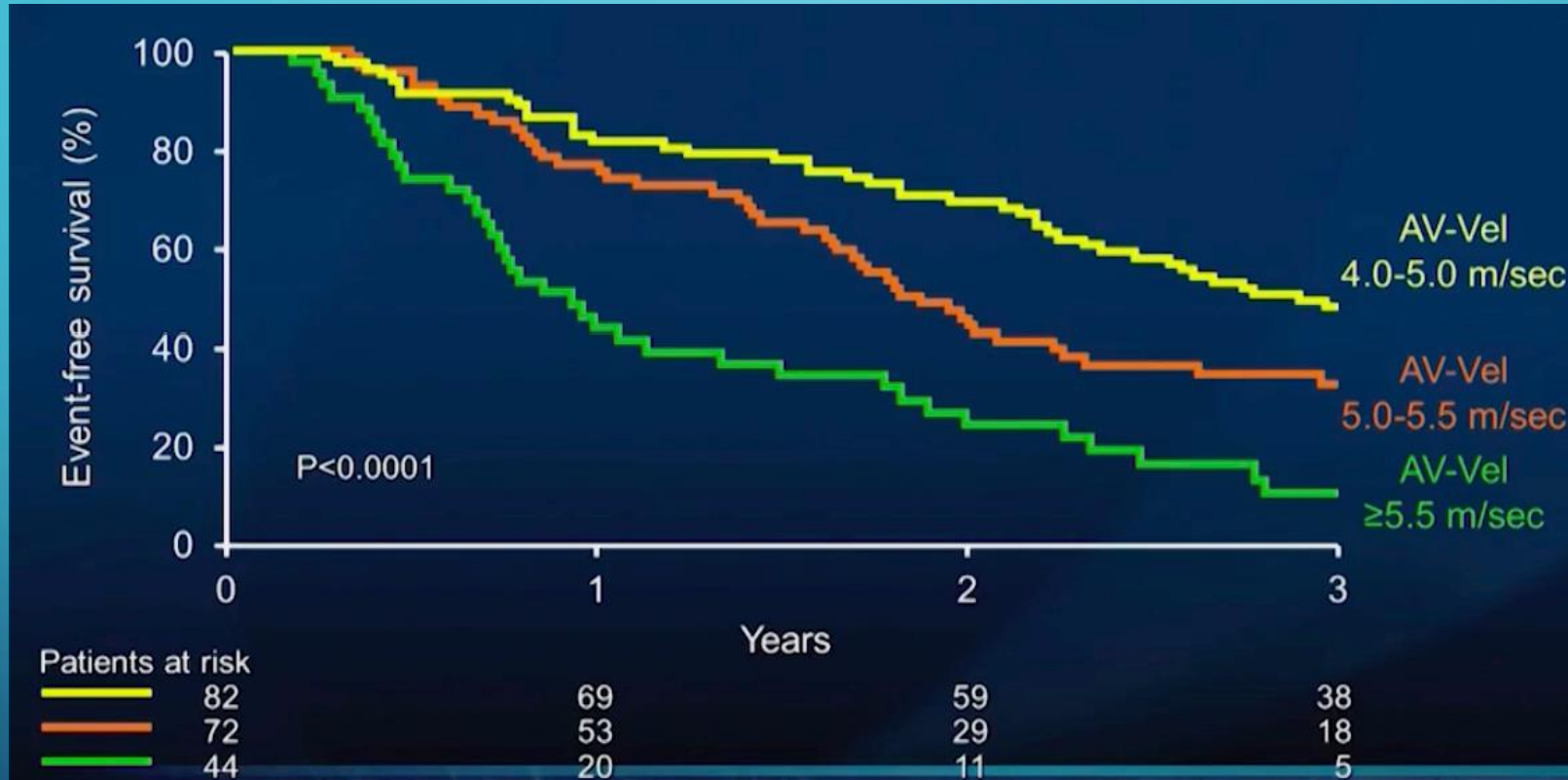
Aortic Stenosis

Treatment: Aortic Valve Replacement

- When to operate?
 - severe AS and
 - Symptoms, irrespective of LV function
 - LV dysfunction
 - Exercise-induced symptoms
 - Moderate-severe AS if planned to undergo other cardiac surgery
 - Asymptomatic VERY severe AS.

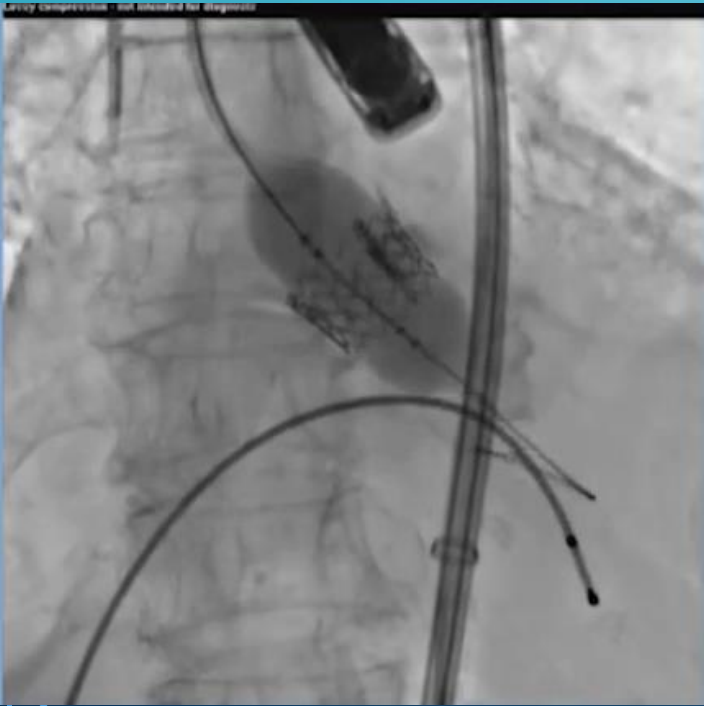


Aortic Stenosis



Aortic Stenosis

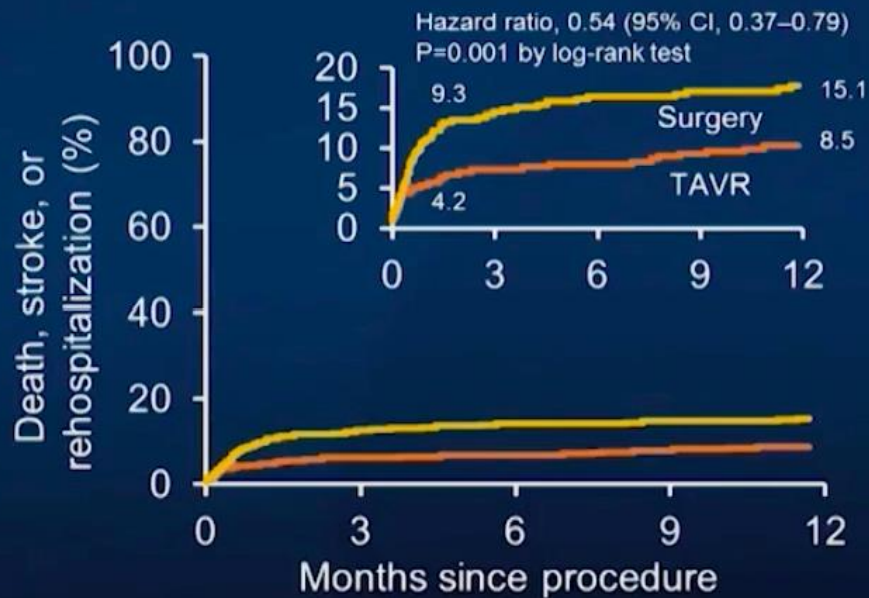
Treatment: Aortic Valve Replacement



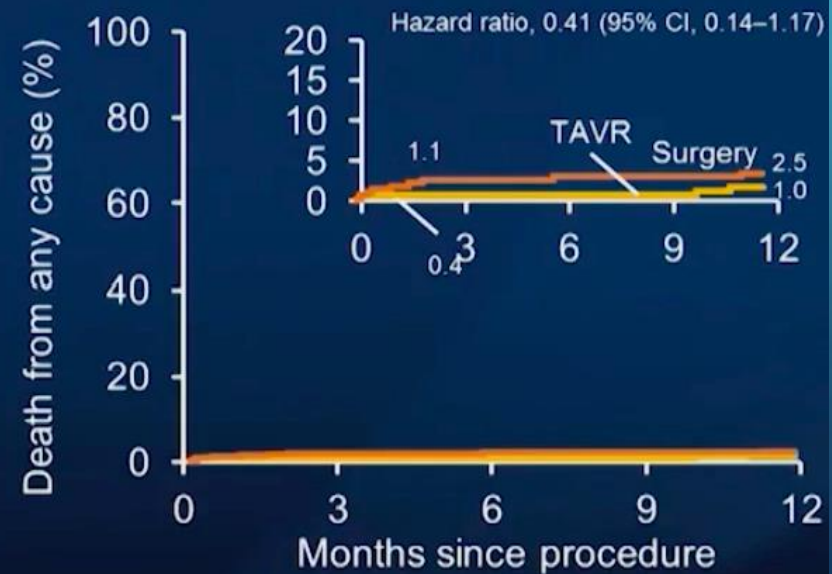
Aortic Stenosis

Treatment: Aortic Valve Replacement

Partner Trial – TAVR vs SAVR in low risk patients



No. at risk	0	3	6	9	12	
— (Surgery)	454	408	390	381	377	374
— (TAVR)	496	475	467	462	456	451



No. at risk	0	3	6	9	12	
— (Surgery)	454	445	438	433	431	427
— (TAVR)	496	494	494	493	492	488

Mitral Stenosis

Etiologies

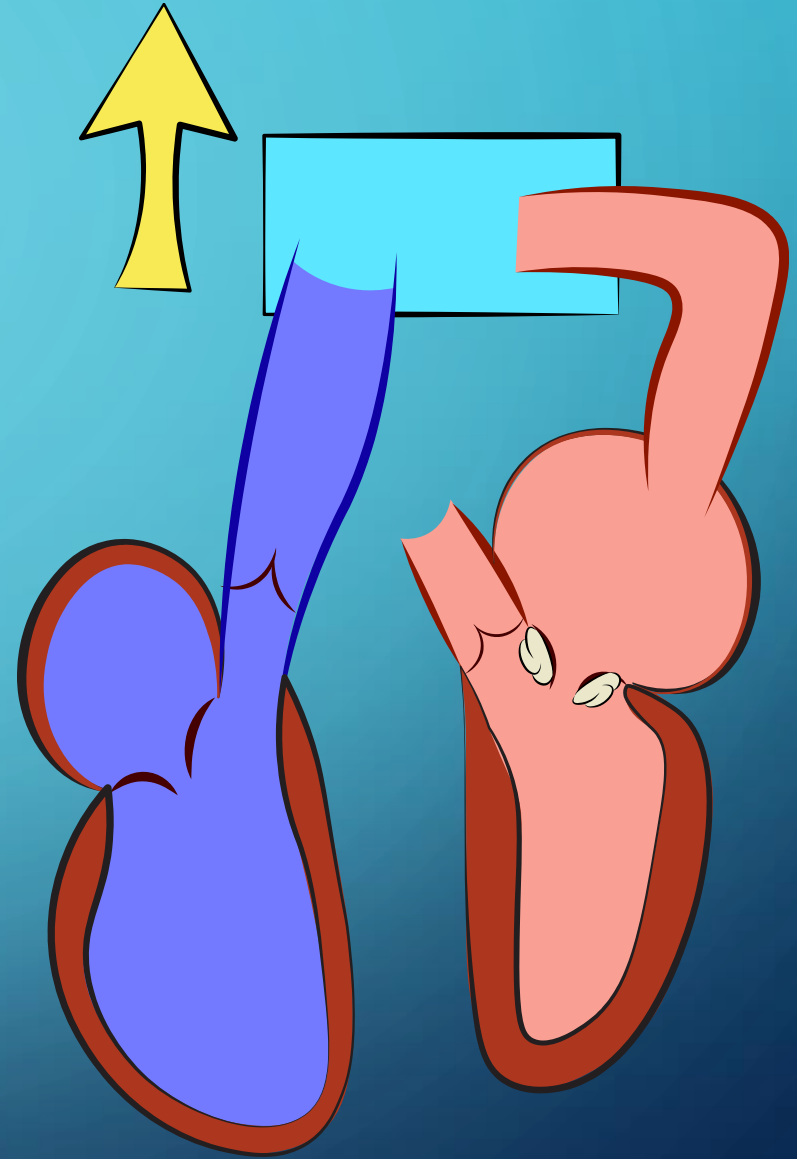
- Rheumatic (most common)
- Degenerative calcification (older age)



Mitral Stenosis

Pathophysiology

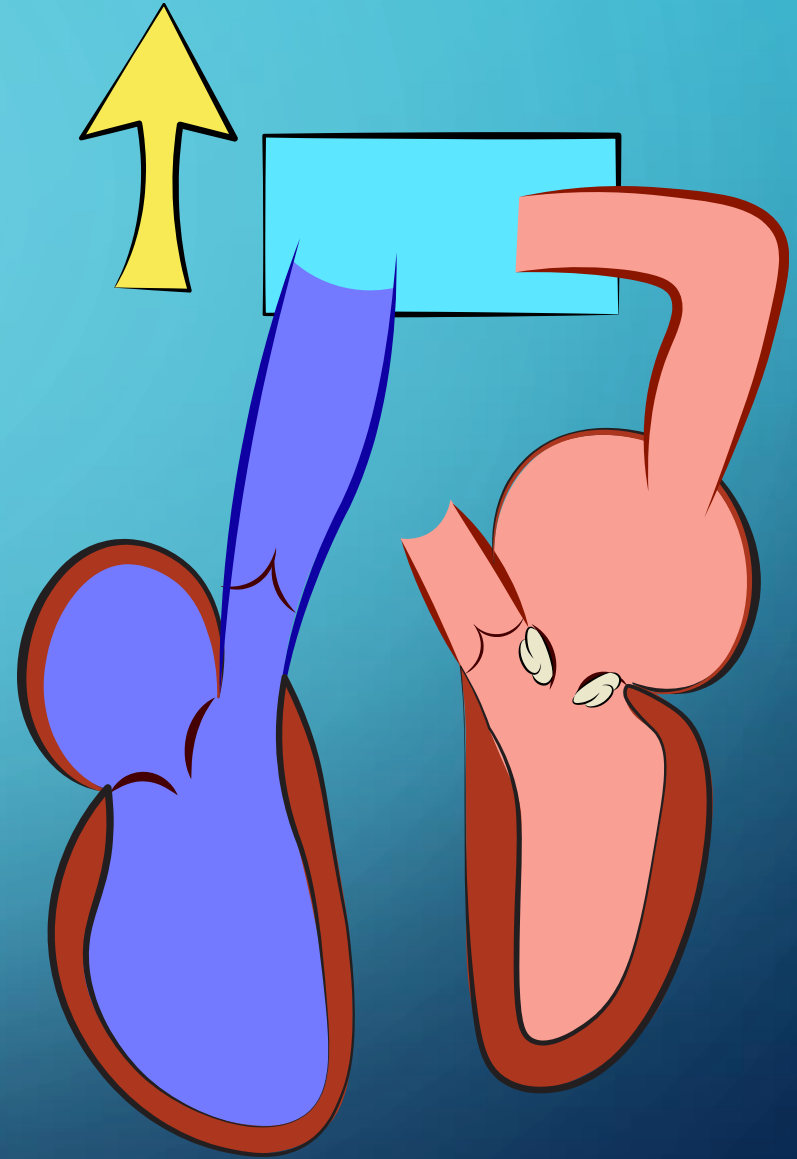
- Unaffected LV
- Elevated LA pressure
- Pulmonary Hypertension
- Atrial arrhythmias
- RV failure



Mitral Stenosis

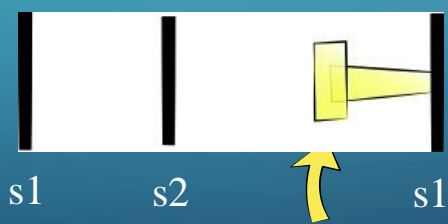
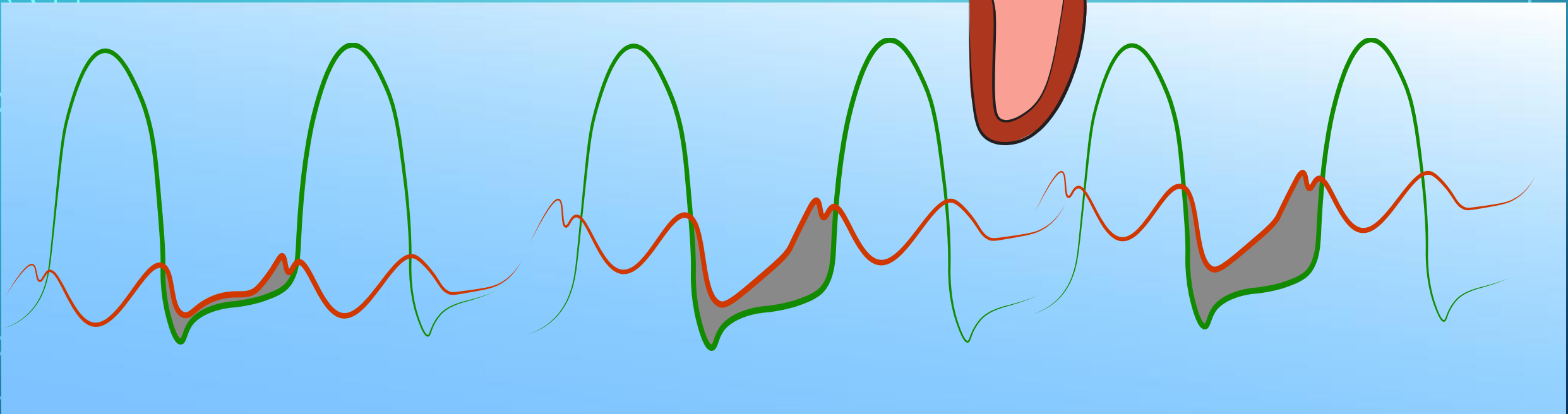
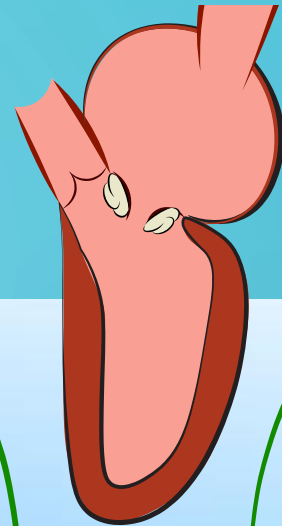
Symptoms

- Dyspnea, PND, orthopnea
 - Slow, progressive course
- Hemoptysis
- Palpitations
- Emboli

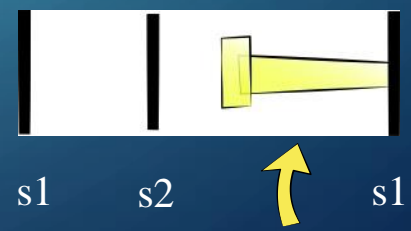


Mitral Stenosis

Pathophysiology

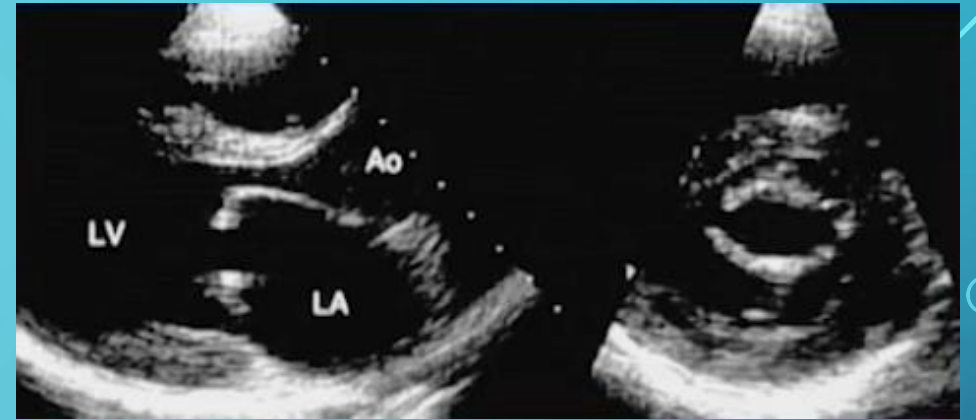
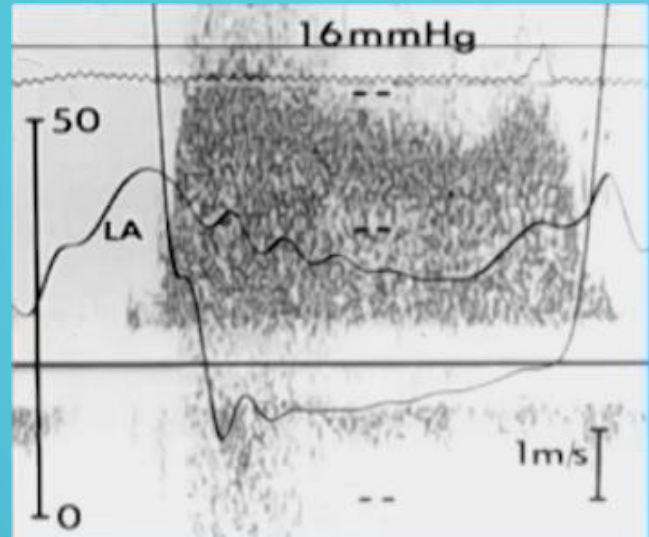


Opening snap + late diastolic murmur



Opening snap + mid-late diastolic murmur

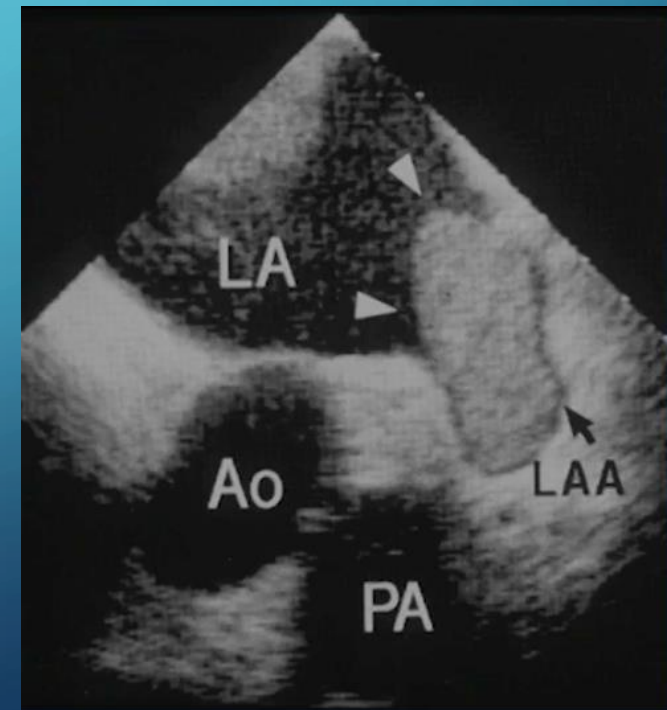
Mitral Stenosis Diagnosis



Mitral Stenosis

Treatment

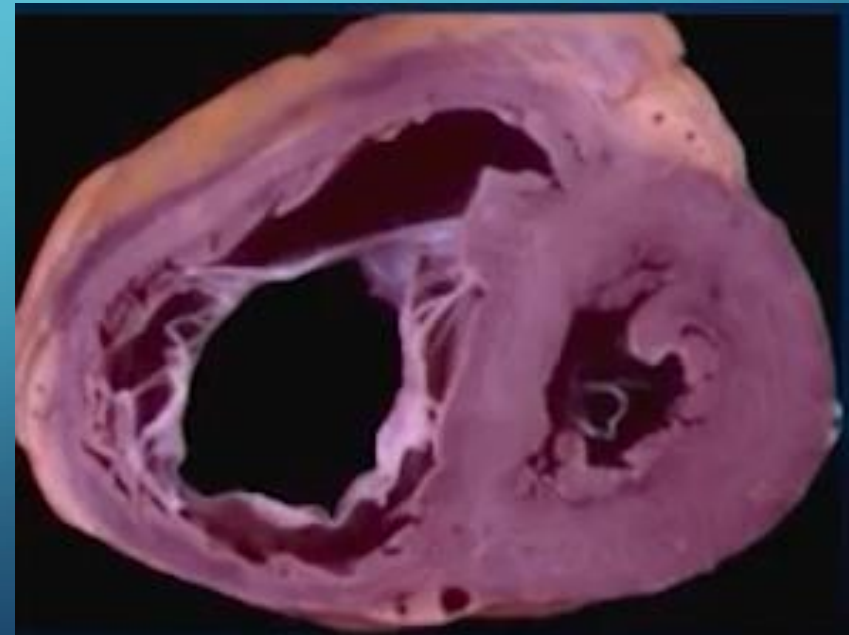
- Indications for intervention:
 - Severe symptoms of heart failure at rest or signs on exercise
 - Mild symptoms if non-surgical management is feasible (percutaneous mitral balloon commissurotomy)
- Anticoagulation if atrial fibrillation



Tricuspid Regurgitation

Etiology

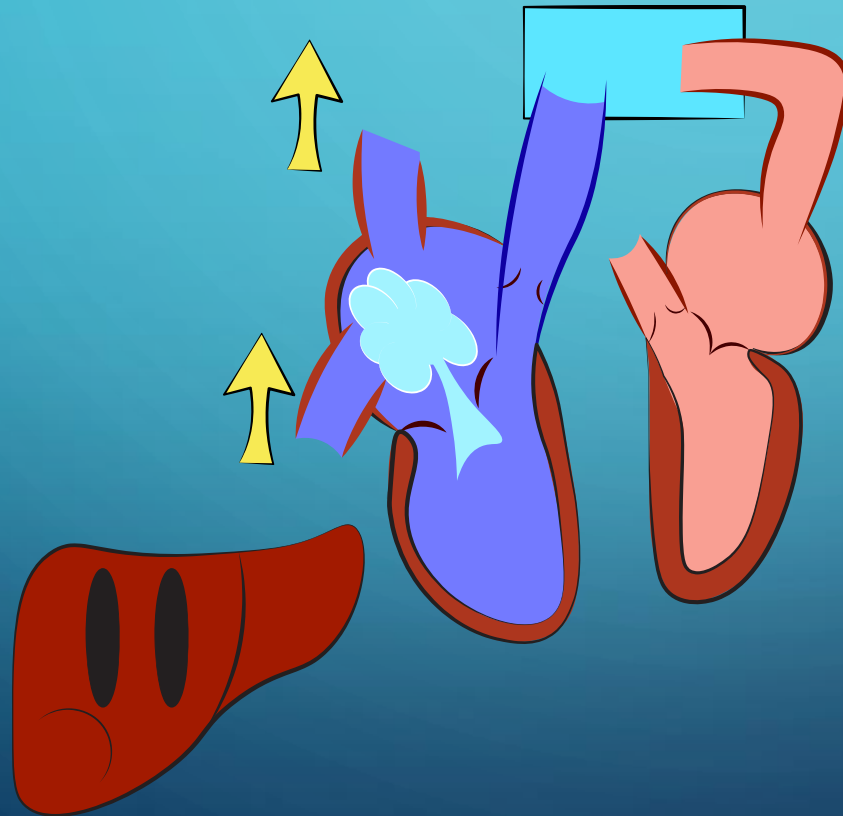
- **Primary Valvular**
 - Rheumatic
 - Congenital
 - Endocarditis
 - Carcinoid tumor
 - Pacemaker Leads
- **Secondary**
 - Dilated cardiomyopathies
 - Pulmonary HTN
 - Atrial fibrillation and annular dilation



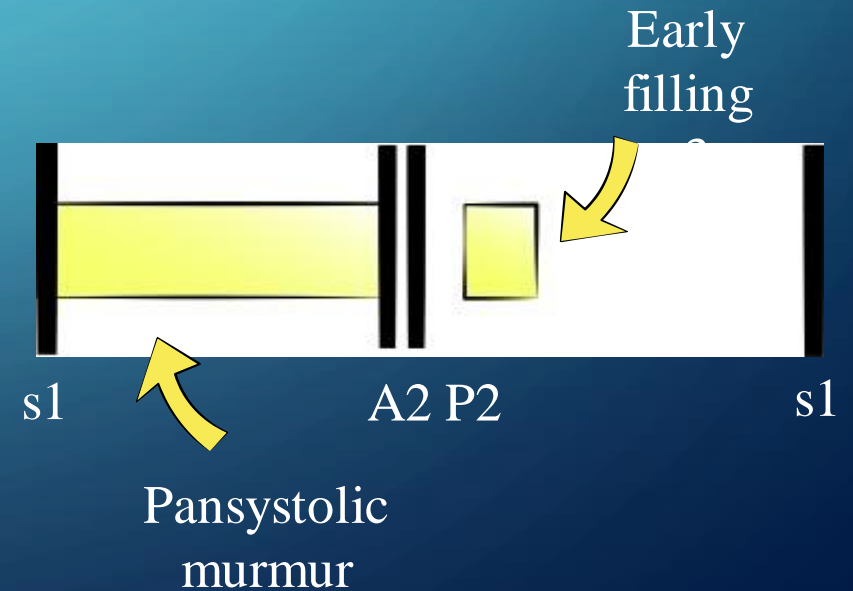
Tricuspid Regurgitation

Clinical Presentation

- History
 - Edema
 - Ascites
 - Fatigue



- Exam
 - Elevated JVP
 - Pulsatile Enlarged Liver
 - Pansystolic murmur



Tricuspid Regurgitation

When to operate?

- Severe symptomatic cases not responding to diuretics
- Severe, if left-sided surgery is planned
- Moderate, if left-sided surgery and RV is enlarged
- If related to a pacemaker lead, attempt lead removal +/- TVR
- If AF, attempt to return to normal sinus rhythm first



Thank You