VALVULAR HEART DISEASE

A Focus on the Role of Primary Care

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DISCLOSURES

None

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Which of the following parameters is NOT an indication for mitral valve repair in a patient with chronic severe mitral regurgitation?

A. Left ventricular enlargement
B. Left ventricular systolic dysfunction
C. Mitral regurgitant volume >60 mL
D. Development of pulmonary hypertension
E. New onset atrial fibrillation

How frequently should a patient with asymptomatic severe aortic regurgitation with mild left ventricular enlargement undergo echocardiography?

A. Every 3 years
B. Every 2 years
C. Annually
D. Every 6 months
E. Every 3 months

Which of the following patients should NOT participate in competitive athletics?

A. An asymptomatic 18 year old with moderate bicuspid aortic stenosis, normal aortic size, and normal LV function wishing to play high school football

B. An asymptomatic 35 year old with severe mitral regurgitation, left ventricular enlargement, and a LVEF of 55% wishing to train for the Iron Man Triathlon

C. An asymptomatic 23 year old with severe aortic regurgitation, normal aortic and left ventricular size, and a LVEF of 55% wishing to join a competitive volleyball league

D. An asymptomatic 28 year with moderate mitral stenosis in sinus rhythm wishing to join a competitive soccer league

E. All of the above

Which of the following patients scenarios requires antibiotic prophylaxis?

A. A 32 year old with a bicuspid aortic valve undergoing a routine dental cleaning

B. A 65 year old with a bioprosthetic aortic valve undergoing excision and drainage of furuncle in the right axilla

C. A 42 year old male with a history of mitral valve repair undergoing cystoscopy for evaluation of asymptomatic microscopic hematuria

D. A 55 year old with a mechanical aortic valve undergoing upper endoscopy

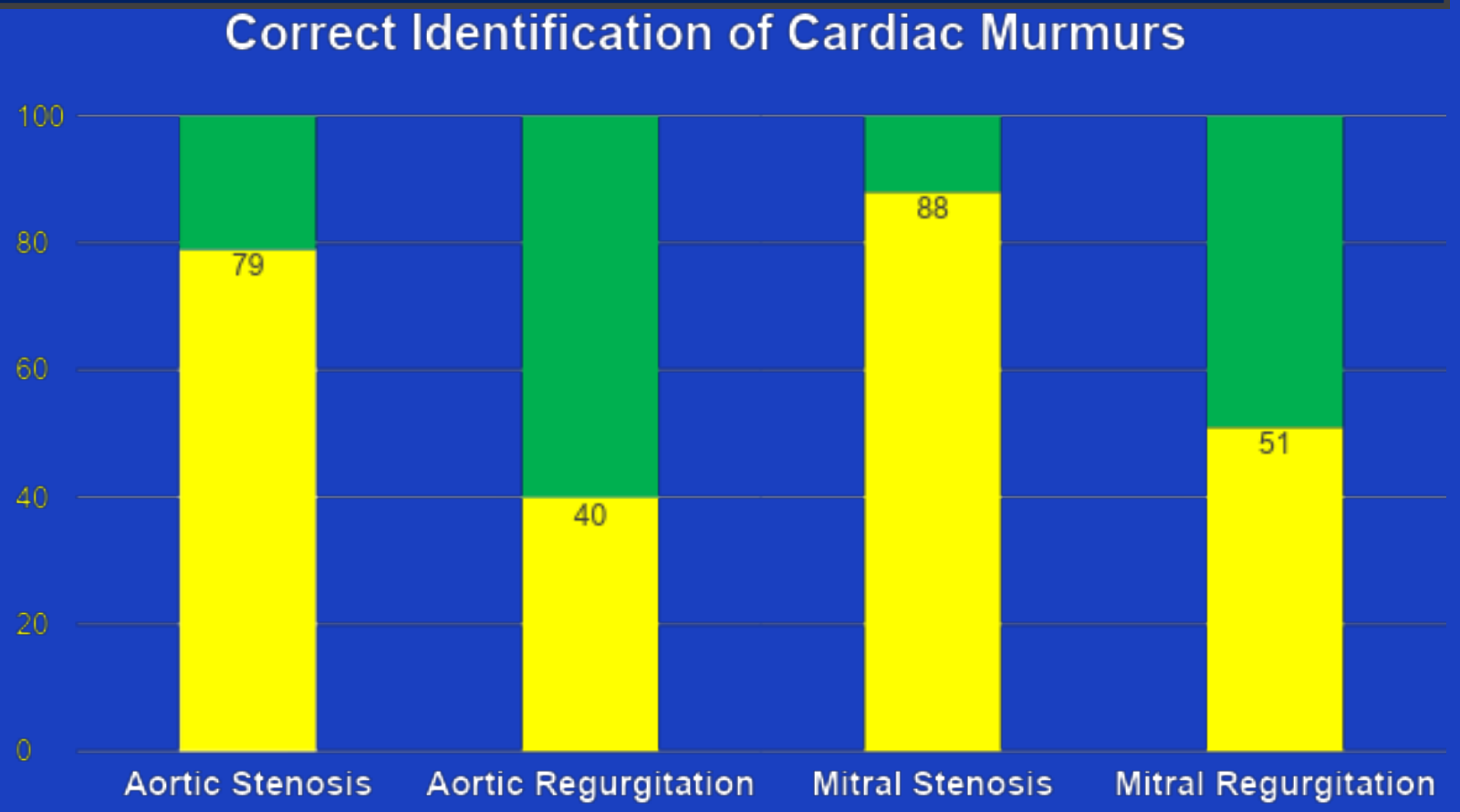
E. All of the above

Educational Goals

1. Understand the current diagnosis and classification of valvular heart disease (VHD) and severity
2. Review that basics of echocardiography and interpreting the echo report in patients with VHD
3. Know the appropriate baseline and serial diagnostic testing for patients with VHD
4. Know when to refer patients for valve intervention
5. Understand the basics of counseling of patients with VHD regarding exercise and competitive athletics
6. Understand the basics of counseling of patients with VHD regarding pregnancy
7. Know the current antibiotic prophylaxis guidelines

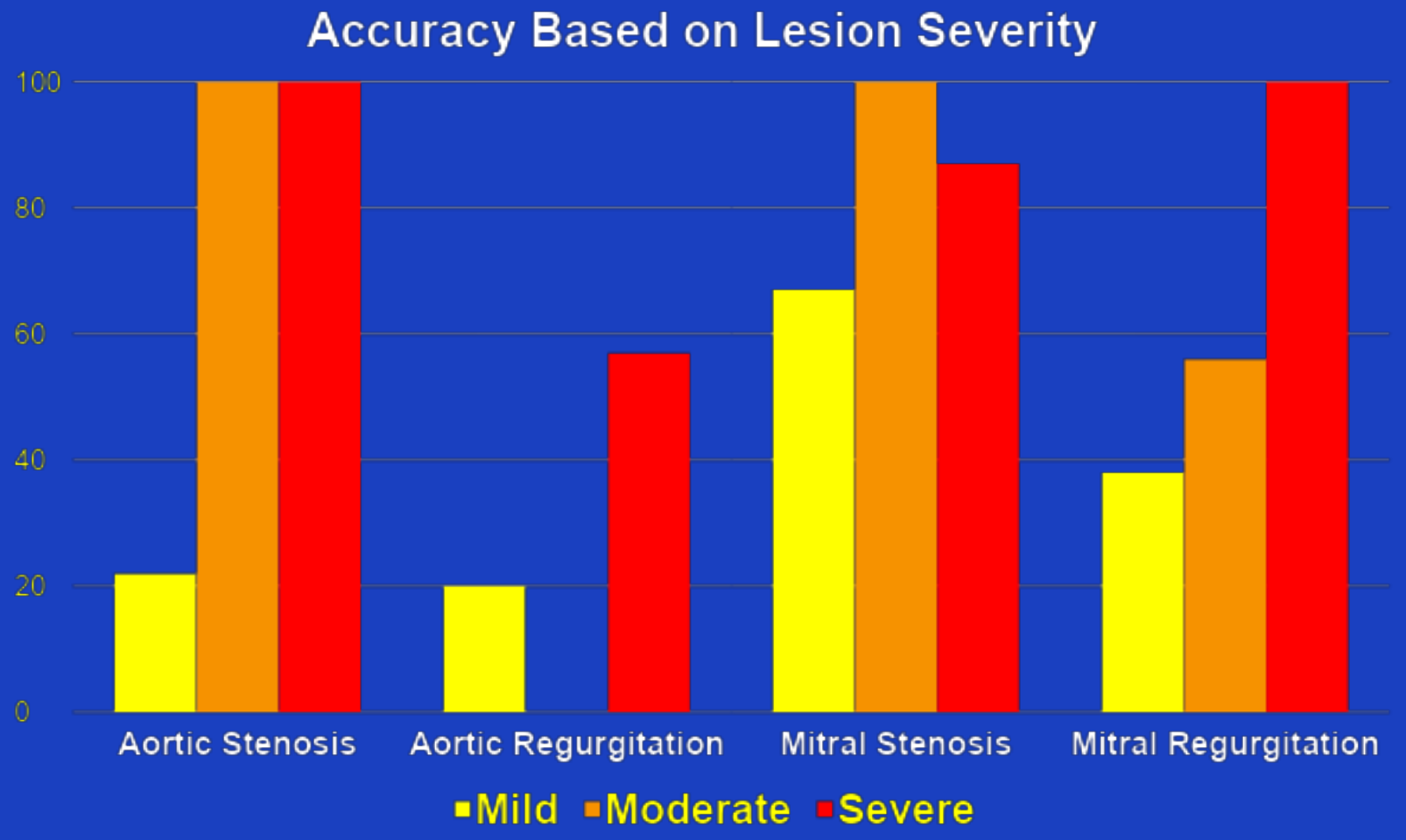
Auscultation of Cardiac Murmurs
Is It Really Useful?

Accuracy of Auscultation in Identifying Valve Disease



Patel A et. al. Indian Heart Journal 2017; (69):141-145

Accuracy of Auscultation in Identifying Valve Disease



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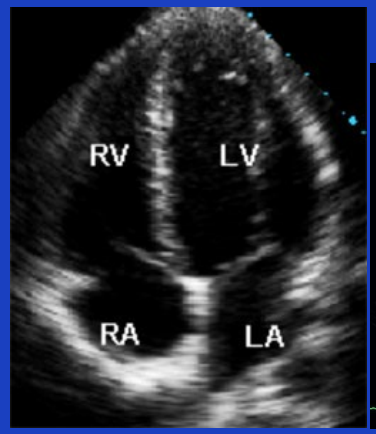
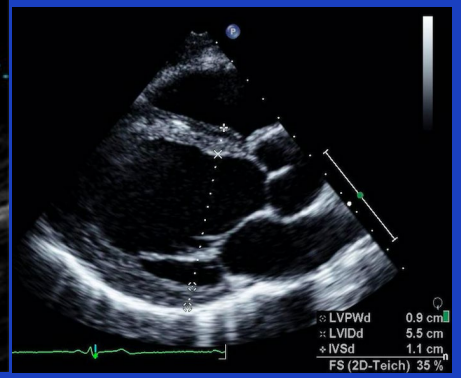
Clues Suggesting a Pathologic Murmur

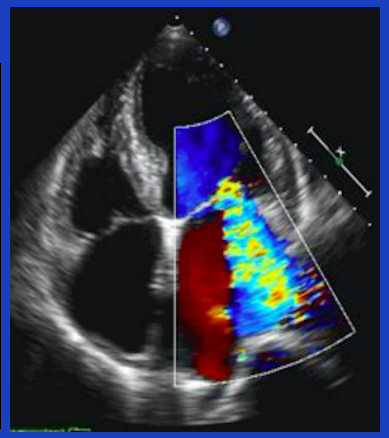
- Loud intensity (grade 3 or greater)
- Long murmur duration
- Prominent radiation to the neck or axillae
- Changes in intensity with maneuvers (squatting, Valsalva)
- Any diastolic murmur
- Other abnormal heart sounds (clicks, snaps, abnormal S_2)
- Abnormal arterial pulsation
- Jugular venous distension
- Enlarged apical impulse

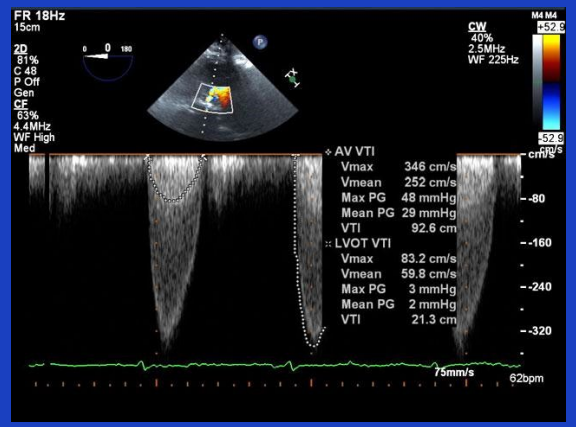
Fundamentals of Echocardiography

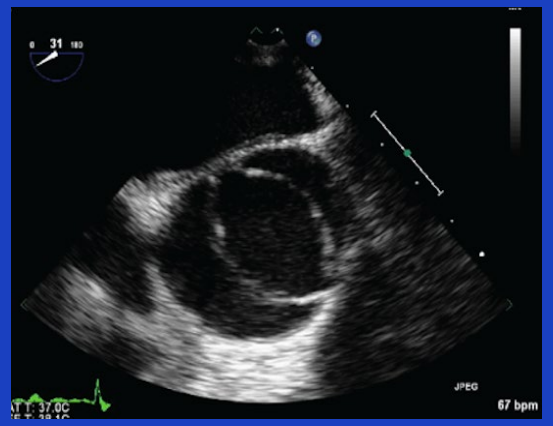
The Gold Standard for the Evaluation of VHD











- **2D Imaging**
  - Valve morphology
  - Chamber size and wall thickness
  - Ventricular function
- **Spectral Doppler**
  - Flow and pressure gradient measurement
  - Essential for evaluation of valvular stenosis
- **Color flow Doppler**
  - Blood flow direction and volume
  - Essential for assessment of valve regurgitation
- **Other modalities**
  - Transesophageal echo
  - Stress echocardiography
  - Dobutamine stress echocardiography
  - 3D echo
  - Tissue doppler and strain

Echocardiography

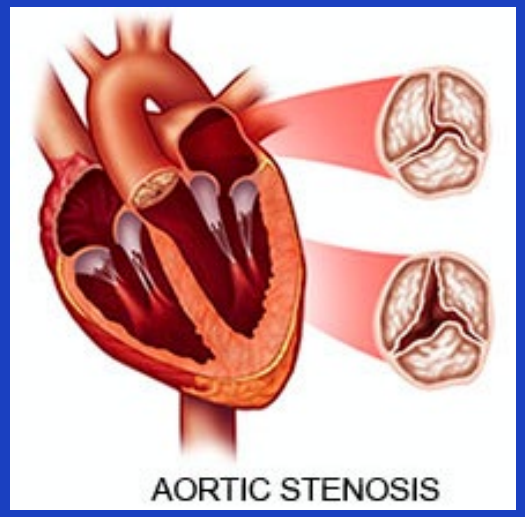
Parameters to Follow in Valvular Heart Disease

Parameter		Severe
Flow measurements	Mean valve gradient	>40 mmHg in AS >10 mmHg in MS
	Valve area	<1.0 cm^2 in AS <1.5 cm^2 in MS
	Regurgitation severity	Regurgitant volume >60 mL
Left ventricle	LV size	LVESD >40 mm in MR LVESD >50 mm in AR
	LV function	LVEF <50% in AS LVEF <55% in AR LVEF <60% in MR
Left atrial size		Volume index >40 mL/m^2
Aortic diameter		>5.0 mm bicuspid aortic valve >4.5 mm Marfan/Ehlers Danlos
Pulmonary artery pressure		PAS >50 mmHg

Stages of Progression of Valvular Heart Disease

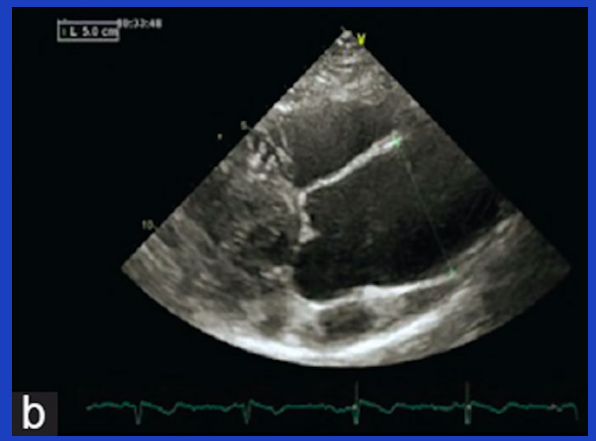
Stage	Definition	Description
A	At risk	Patients with risk factors for the development of valvular heart disease
B	Progressive	Patients with progressive VHD of mild-to-moderate severity and asymptomatic
C	Progressive severe	Criteria for severe valve disease but asymptomatic: C1: Preserved ventricular function C2: Impaired ventricular function
D	Severe symptomatic	Severe valve disease with symptoms

Aortic Stenosis



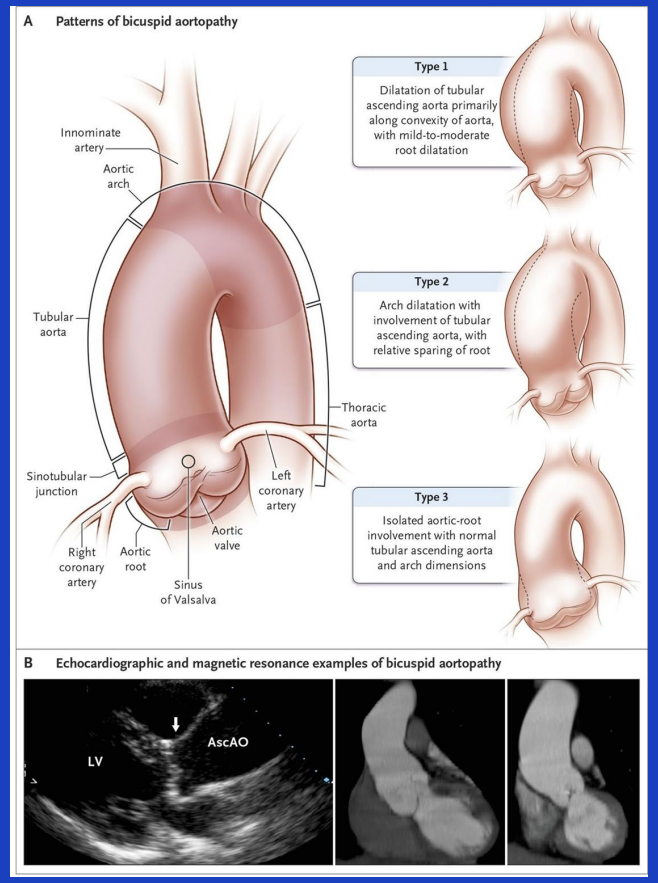
- Most common primary valve disorder leading to surgery or catheter intervention
- Leading cause of VHD related mortality
- Moderate-severe AS in ~3% of patients >75 years
- Physical exam clues:
  - Loud and late peaking systolic murmur
  - Single or paradoxically split S2
  - Delayed and diminished carotid upstroke
- Cardinal symptoms:
  - Exertional dyspnea
  - Angina
  - Syncope
- Typical progression of 3 mmHg and 0.1 cm^2/year
- Urgent intervention indicated when symptoms develop (stage D) -- ~50% mortality ensuing 12 months

Bicuspid Aortic Valve



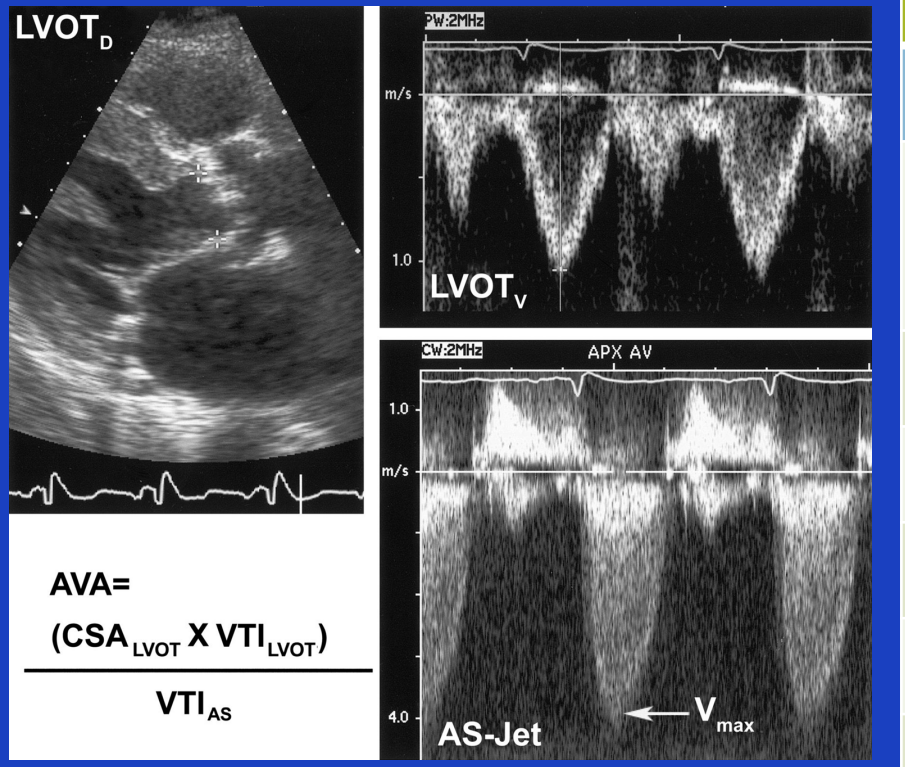
- Most common congenital heart defect (1-2%)
- 50% of severe AS younger than 70 due to BAV
- 30-50% will become stenotic by age 60
- Responsible for more deaths than all other congenital heart defects combined
- 3:1 male predominance
- Autosomal dominant with incomplete penetrance
- ~10% of family members affected – screen first degree relatives!
- 50% of patients with BAV have associated aortopathy (5% annual risk of dissection)

Bicuspid Aortopathy



- Approximately 50% of patients with BAV have associated aortopathy
- Histologically similar to Marfan syndrome
- Dilation often maximal in distal ascending aorta – CT or MRI needed for initial evaluation
- Aortic aneurysm may be present even with normally functioning BAV
- 9X increased risk of type A dissection
- Aortic replacement indicated when ≥5.0 cm
- Replace aorta at time of valve surgery if ≥4.5
- Exercise should be restricted to low to moderate intensity dynamic exercise

Classification of Severity of Aortic Stenosis by Echo

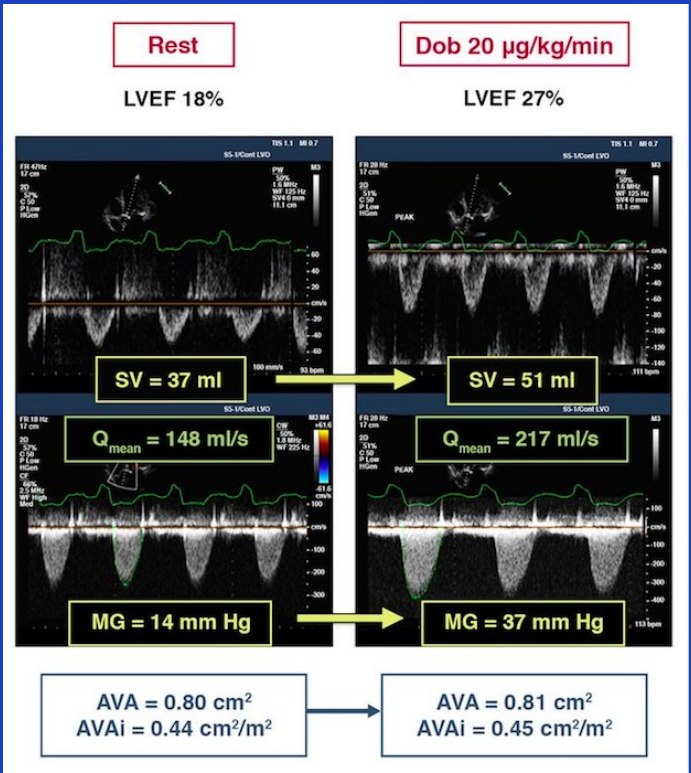


$$AVA = \frac{(CSA_{LVOT} \times VTI_{LVOT})}{VTI_{AS}}$$

Classification of the Severity of Aortic Stenosis					
Variable	Aortic Stenosis				
	Mild	Moderate	Severe (stage C1)	Severe (stage C2)	Low gradient severe
Vmax (m/s)	2.0-2.9	3.0-3.9	>4.0	>4.0	2.0-4.0
Mean gradient	<20	20-39	≥40	≥40	<40
Valve area	>1.5	1.0-1.5	<1.0	<1.0	<1.0
Area index			<0.6		
LVEF	>55	>55	>55	≤50	≤50

Low Gradient Severe Aortic Stenosis: A Special Exception

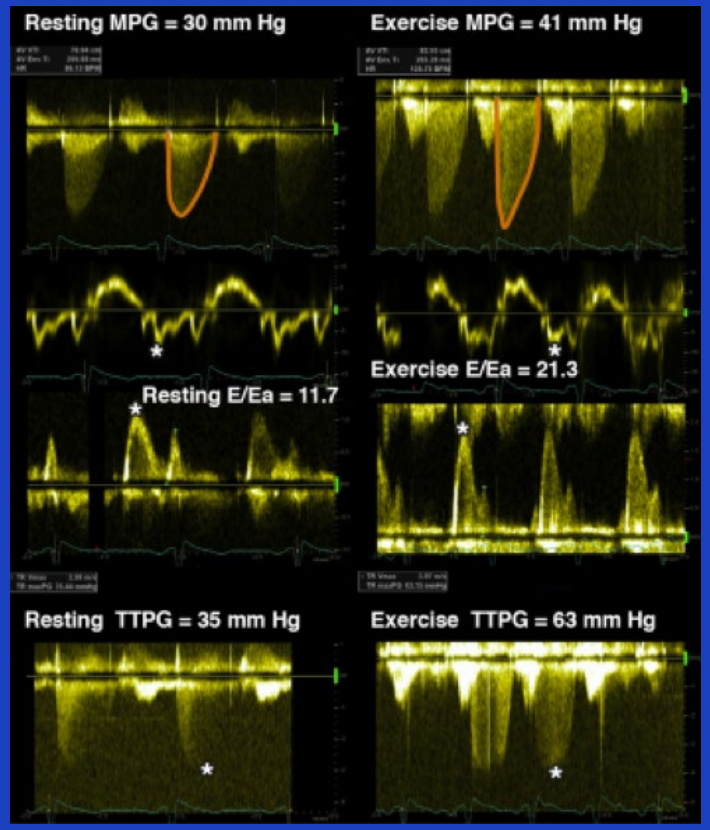
Evaluate with Dobutamine Stress Echo



- **Definition of low gradient severe AS**
  - Mean aortic valve gradient <40 mmHg
  - Aortic valve area ≤1.0 cm^2
  - LVEF ≤50%
- **Dobutamine Stress Protocol**
  - Baseline and peak stress LVOT and AoV flow (VTI)
  - Dobutamine IV at 5 mcg increments every 5 minutes to maximum dose of 20 mcg/kg/min
- **True Severe AS**
  - $LVOT_{VTI}$ and AoV_{VTI} increase proportionally
  - Mean gradient increases and valve area ≤1.0 cm^2
- **Pseudo Severe AS**
  - $LVOT_{VTI}$ increases > AoV_{VTI}
  - Mean gradient increases, but valve area ≥1.2 cm^2

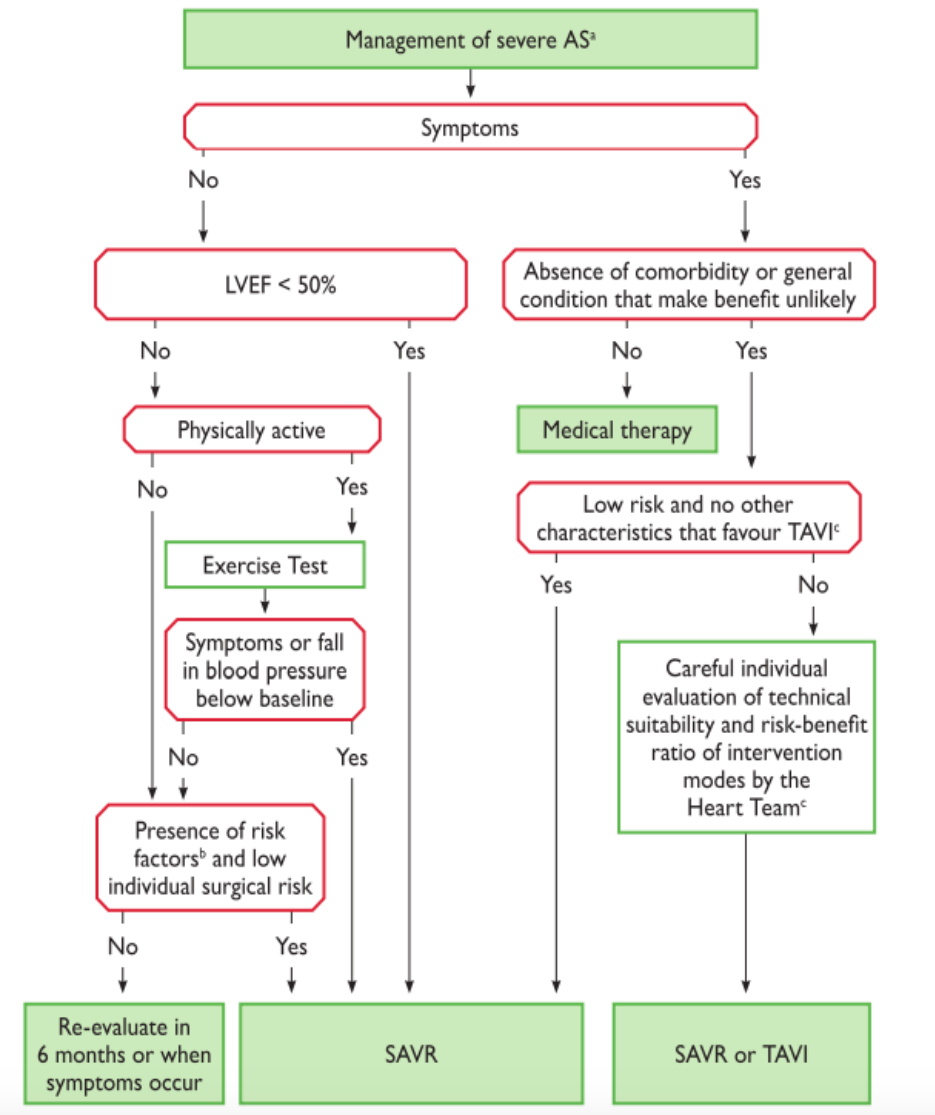
Exercise Stress Testing with Aortic Stenosis

Not for the faint of heart



- Physician supervision required
- Helpful in determining if AS is truly asymptomatic
- Necessary for medical clearance for competitive athletic participation
- Abnormal Response:
  - Symptoms
  - ST depression >2 mm
  - Arrhythmias
  - Drop in BP (or failure to increase SBP >20)
  - Increase in mean gradient >20
  - Increase in pulmonary artery pressure
  - No increase in LVEF

Management of Aortic Stenosis



- **Medical Therapy**
  - **Medical therapy does NOT impact progression**
  - **Treat associated hypertension – ACEI and ARBs preferred, beta blockers if CAD**
  - ***Avoid* nitrates and diuretics**

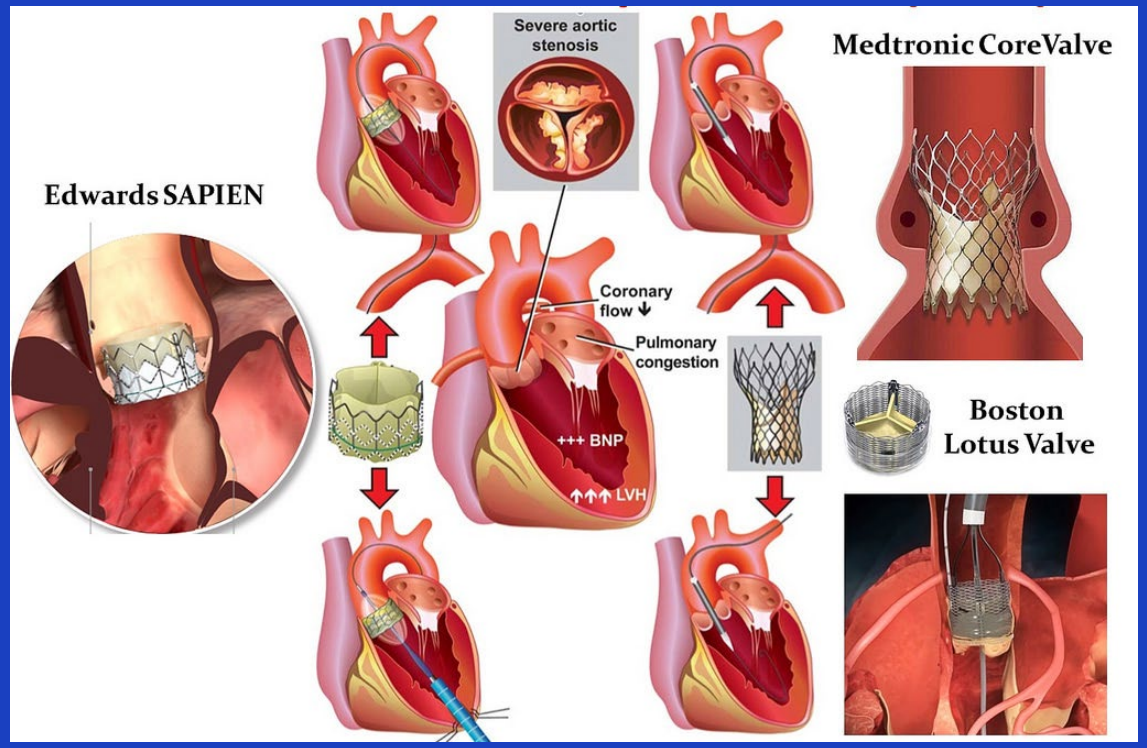
Follow-up Echo Assessment

- **Mild stenosis: Every 3 years**
- **Moderate stenosis: Every 1 year**
- **Severe stenosis: Every 6-12 months**
- **If aortic enlargement, repeat echo every 1 year with repeat CT or MR if >3 mm increase**

Additional Diagnostic Testing

- **Transesophageal echo helpful if uncertainty regarding valve morphology**
- **Stress testing if symptom uncertain**
- **Baseline CT or MRI in *ALL* patients with bicuspid valve**

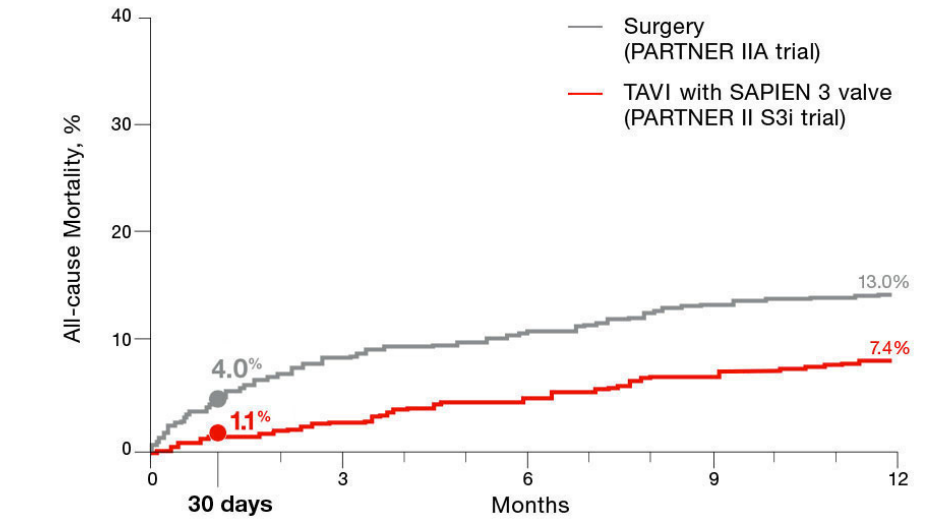
Transcatheter Aortic Valve Replacement



- Transfemoral or axillary artery and transapical catheter based aortic valve replacement
- FDA approved since 2012 for patients at intermediate to high surgical risk
- Requires Heart Team assessment
- Surgical Risk – STS Score (riskcalc.sts.org)
  - Low risk ≤3%
  - Intermediate risk 4-7%
  - High Risk ≥8%

SAVR versus TAVR
All Cause Mortality and Stroke

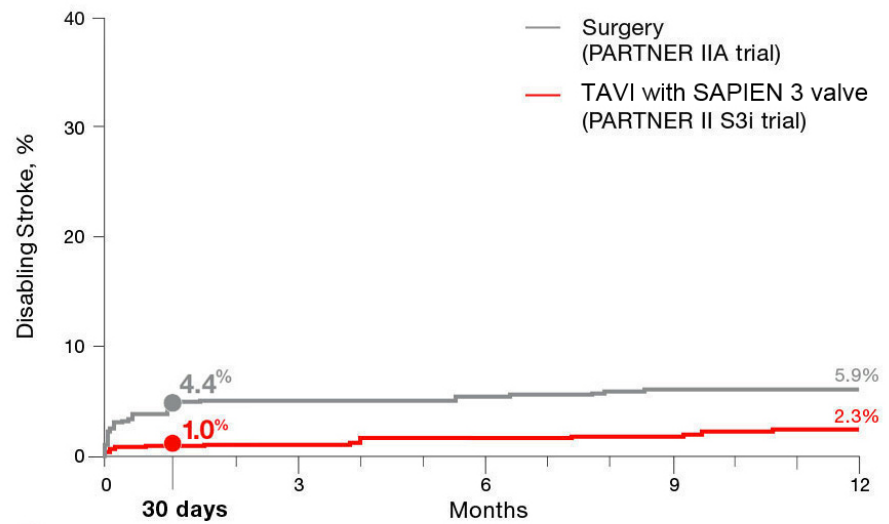
The PARTNER II Trial Intermediate-Risk Cohort Clinical Outcomes
All-cause Mortality†



No. at risk:

Surgery	944	859	836	808	795
SAPIEN 3 TAVI	1,077	1,043	1,017	991	963

The PARTNER II Trial Intermediate-Risk Cohort Clinical Outcomes
Disabling Stroke†

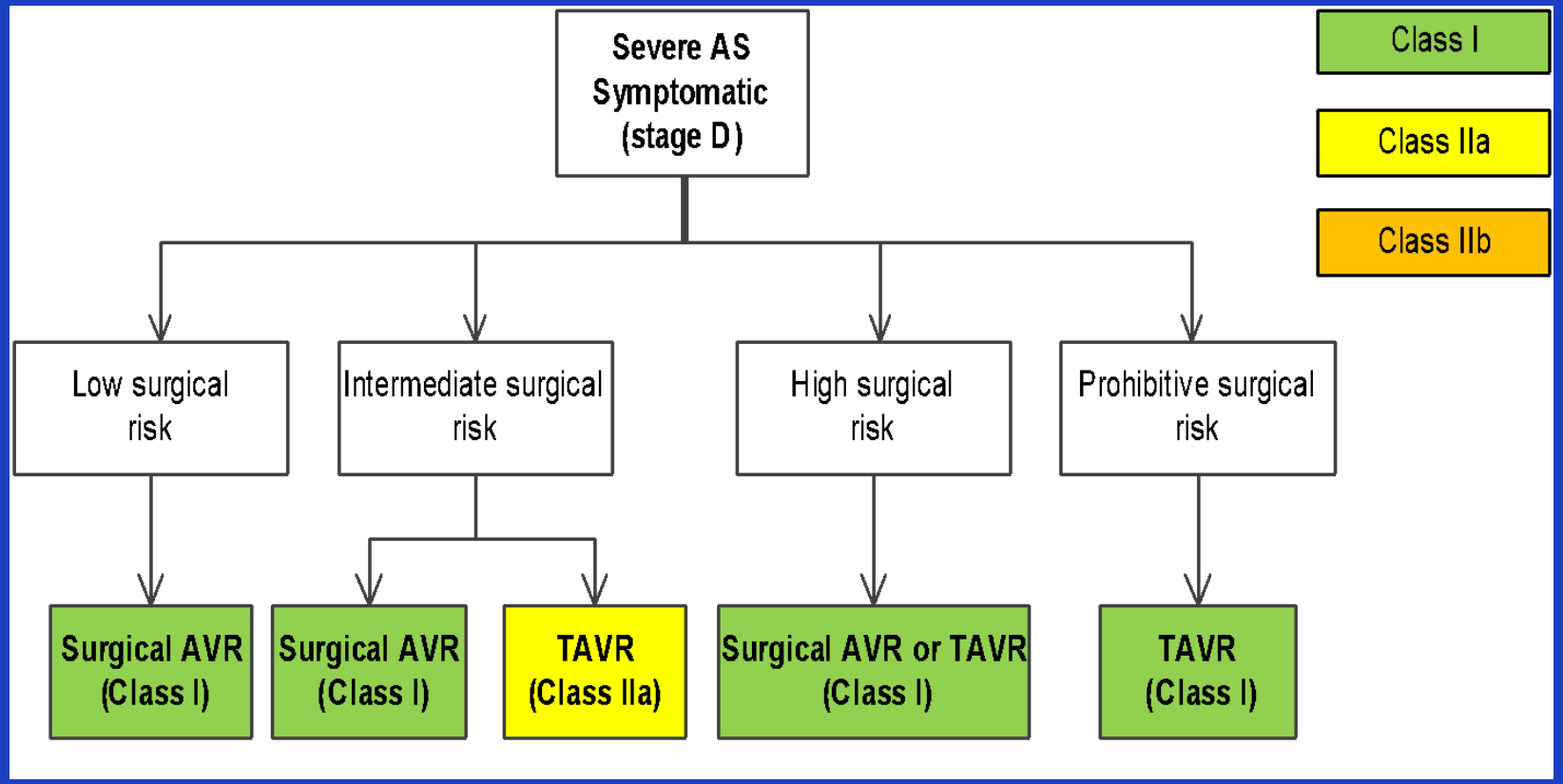


No. at risk:

Surgery	944	825	806	778	764
SAPIEN 3 TAVI	1,077	1,033	1,008	984	953

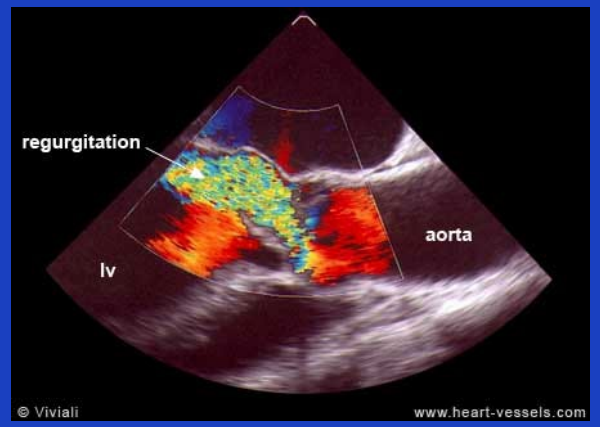
Leon MB et al. NEJM 2016; 374:1609-1620.

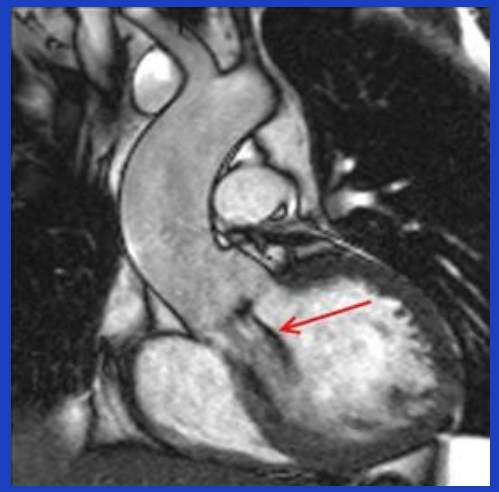
SAVR versus TAVR for Aortic Stenosis
2017 Guideline Update



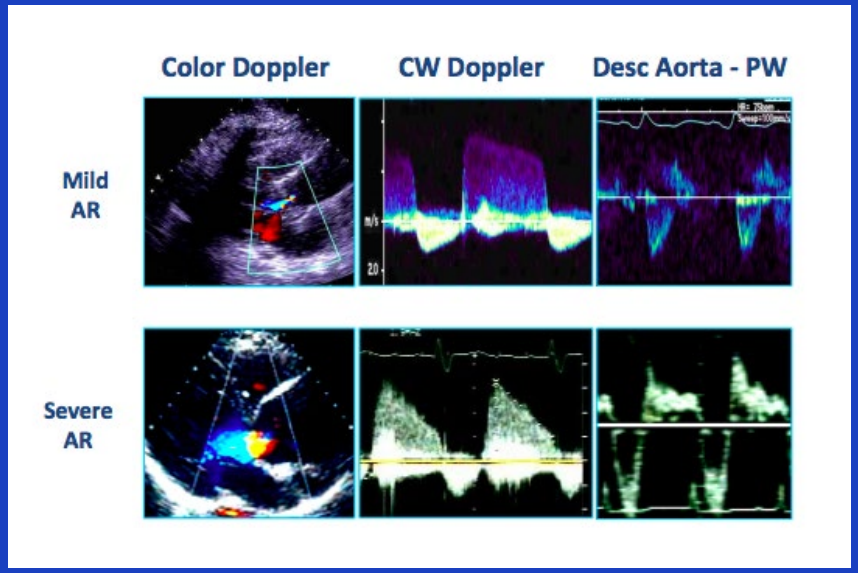
Chronic Aortic Regurgitation

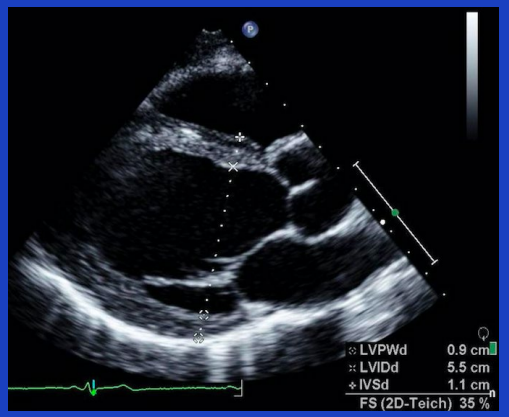
- **Causes**
  - Valvular
    - Congenital (bicuspid)
    - Inflammatory (SLE, rheumatoid arthritis, Behçets)
    - Post infectious (rheumatic, endocarditis)
  - Non-valvular
    - Marfans and Ehlers Danlos syndrome
    - Annuloaortic ectasia
- **Physical exam findings**
  - Decrescendo diastolic murmur along left sternal border
  - Wide pulse pressure
  - Dynamic peripheral pulses and LV apical impulse
- **Diagnostic testing**
  - Echocardiography
  - CT angiogram or cardiac MRI (CMR) for all patients with aortic dilation
  - CMR may be particularly helpful in assessing AR severity

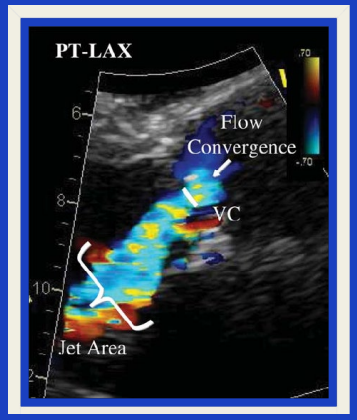




Echocardiographic Assessment of Aortic Regurgitation



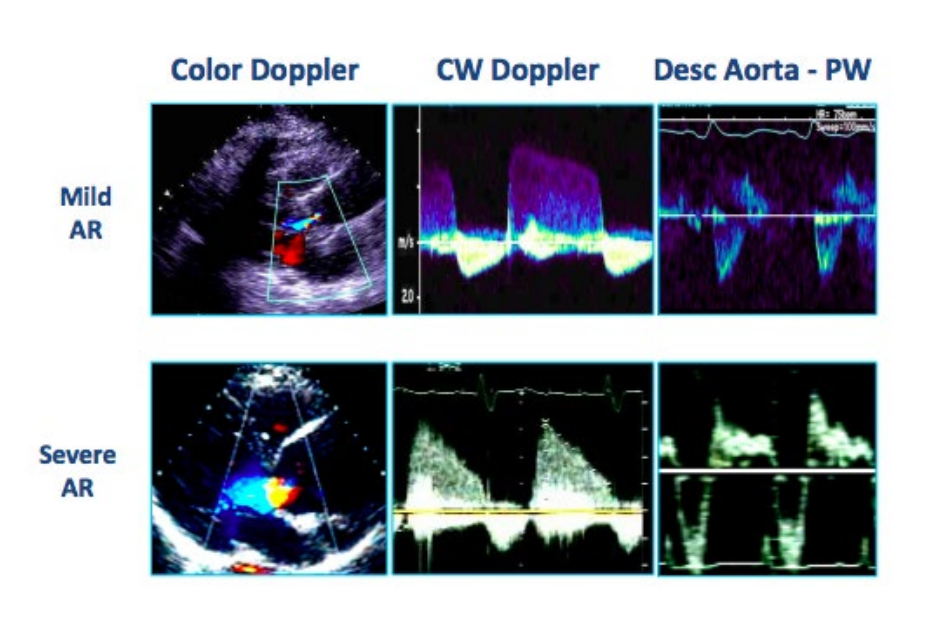




Echocardiographic Variables in Aortic Regurgitation

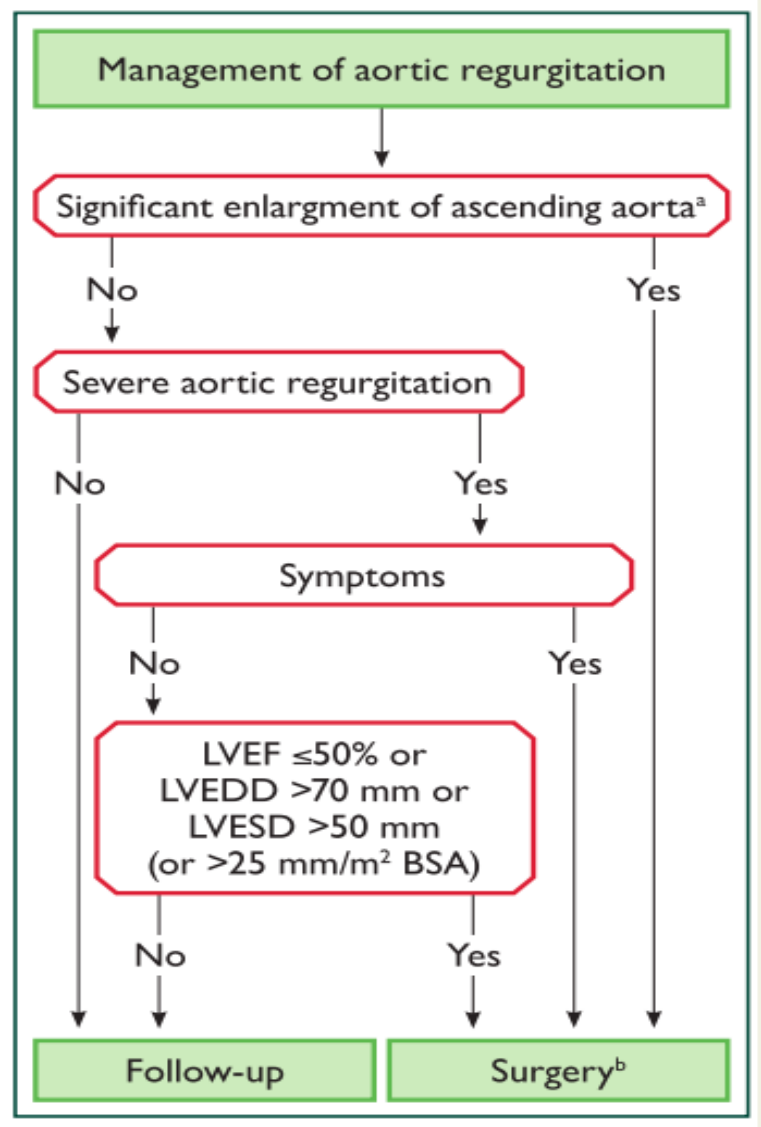
- 2D Imaging
  - Valve morphology
  - Aortic root and ascending aorta
  - LV size and function
- Color flow Doppler
  - Jet area and width
  - Vena contracta
  - Flow convergence (PISA)
- Spectral Doppler
  - Pressure halftime
  - Reversal of flow in descending thoracic aorta

Classification of Severity of Aortic Regurgitation by Echo



Classification of the Severity of Aortic Regurgitation				
Variable	Aortic Regurgitation			
	Mild	Moderate	Severe (stage C1)	Severe (stage C2)
Jet width	<25%	25-65%	>65%	>65%
Vena contracta	<3 mm	3-6 mm	>6 mm	>6 mm
Regurgitant volume	<30 mL	30-60 mL	>60 mL	>60 mL
Regurgitant fraction	<30	30-60	>60	>60
Pressure halftime	>500	200-500	<200	<200
Reversal of flow in descending aorta	None	Early diastole only	Holo-diastolic	Holo-diastolic
LV size	Normal	Normal	ESD <50 mm	ESD ≥50 mm
LV function	EF >50	EF >50	EF>50	EF≤50

Management of Aortic Regurgitation



- **Medical Therapy**
  - Limited role as it does not treat underlying process
  - Treatment associated hypertension – ACEI, ARBs and dihydropyridine calcium blockers preferred; beta blocker if aortic enlargement
- **Follow-up Echo Assessment**
  - Mild regurgitation: Every 3 years
  - Moderate regurgitation: Every 1 year
  - Severe regurgitation: Every 6-12 months
  - LV size and function are critical!!
  - If aortic enlargement, every 1 year; repeat CT or MR if >3 mm increase in size
- **Additional Diagnostic Testing**
  - Transesophageal echo very helpful if uncertainty regarding valve morphology
  - Stress testing if uncertainty regarding symptoms and for athletic participation
  - Cardiac MR if echo imaging inadequate

The Mitral Valve

The Mitral Valve:

A Complex Apparatus

Annulus

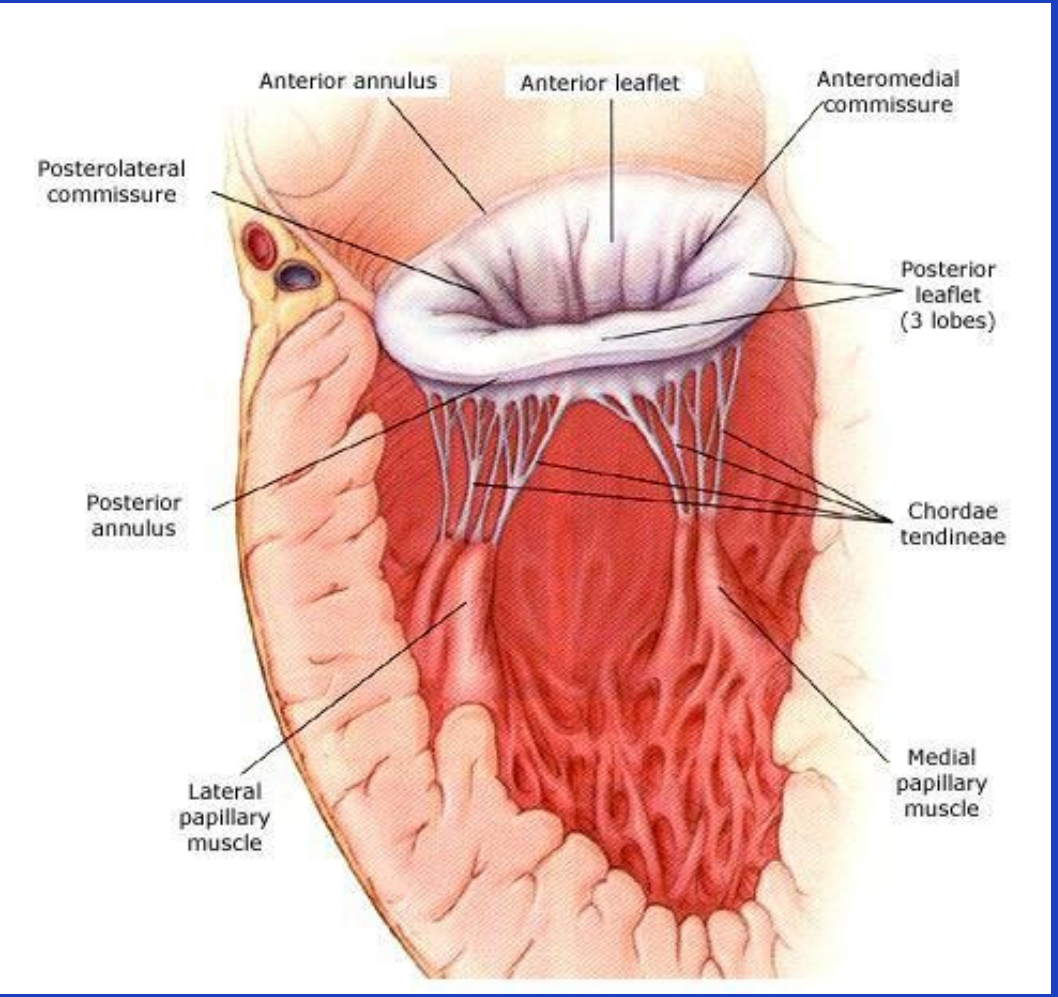
Leaflets

Chords

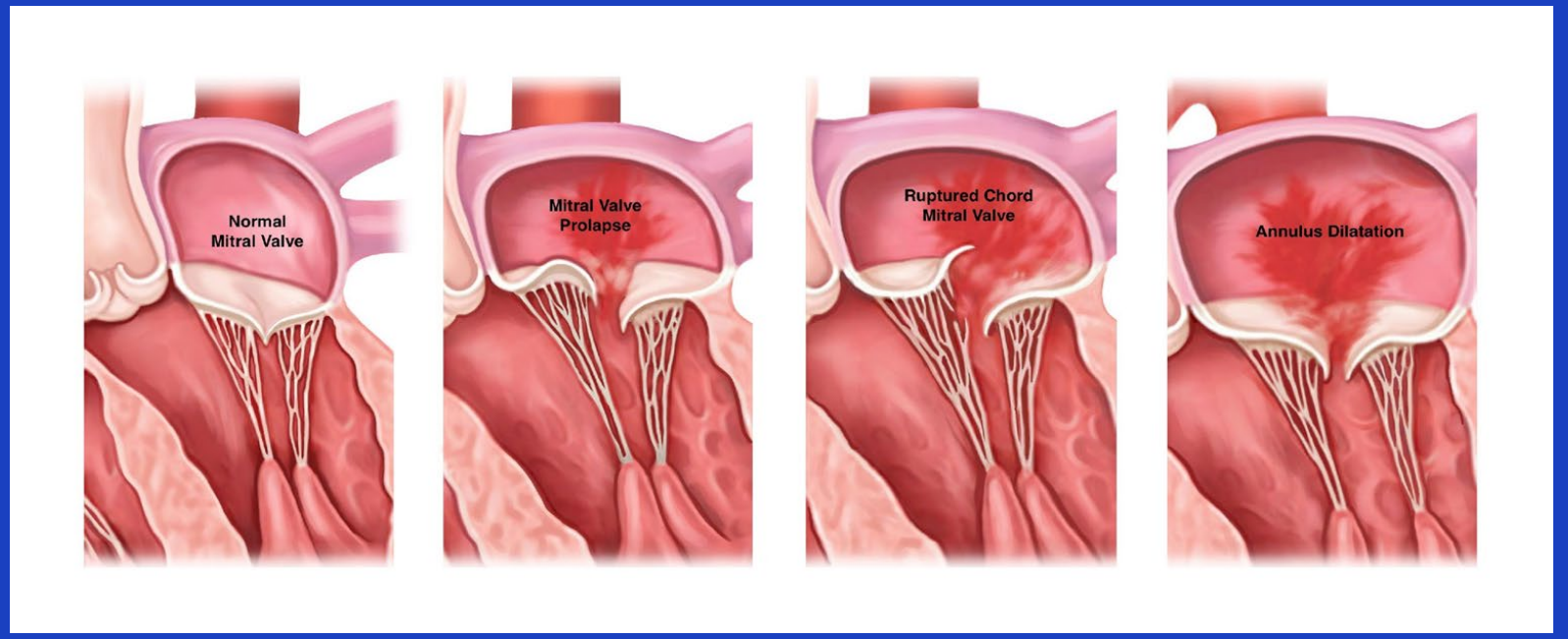
Papillary muscles

Ventricular geometry

Atrial geometry

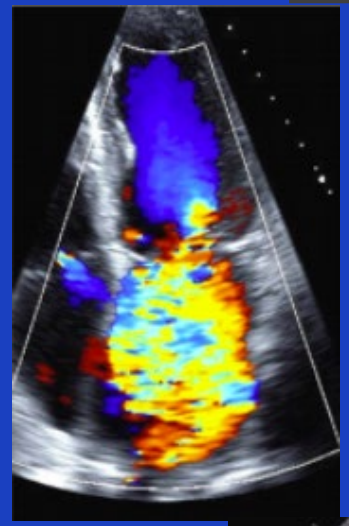


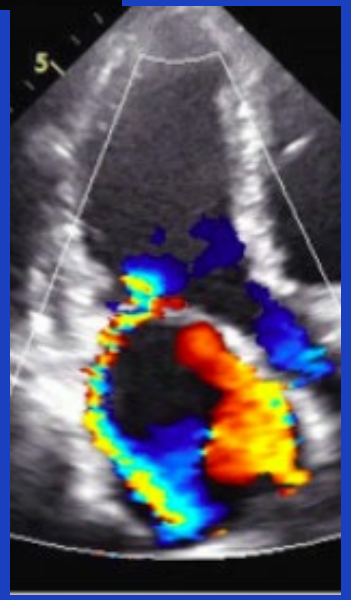
Mitral Regurgitation



- **Primary (degenerative) mitral regurgitation**
  - Related to pathology of the valve (leaflets and/or chords)
  - Ideally treated with mitral valve repair, but sometimes needs replacement
- **Secondary (functional) mitral regurgitation**
  - Due to LV dilation causing papillary muscle displacement and leaflet tethering
  - Treatment focused on underlying cause of LV dysfunction/enlargement
  - Annuloplasty if undergoing cardiac surgery for other indications

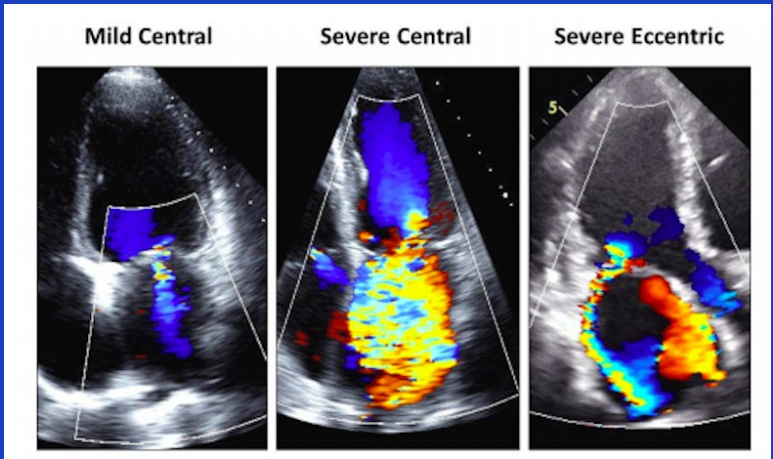
Primary Mitral Regurgitation

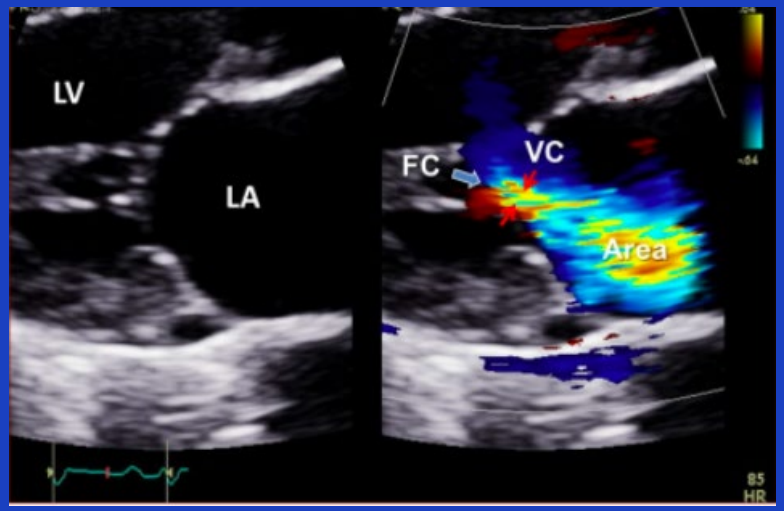




- **Causes**
  - Mitral valve prolapse (most common, 2-3% prevalence in US population)
  - Congenital (cleft mitral valve)
  - Post infarct (up to 10% of patients, particularly inferior MI)
  - Other (rheumatic, endocarditis, trauma)
- **Physical Exam findings**
  - Murmur loudest at apex
  - MVP associated with systolic click and mid-systolic murmur/radiation
  - Often best heard in left lateral decubitus position
  - MVP augmented with maneuvers (Valsalva, squat/stand)
- **Diagnostic assessment**
  - Transthoracic and transesophageal echo
  - Cardiac MRI if inadequate echo images

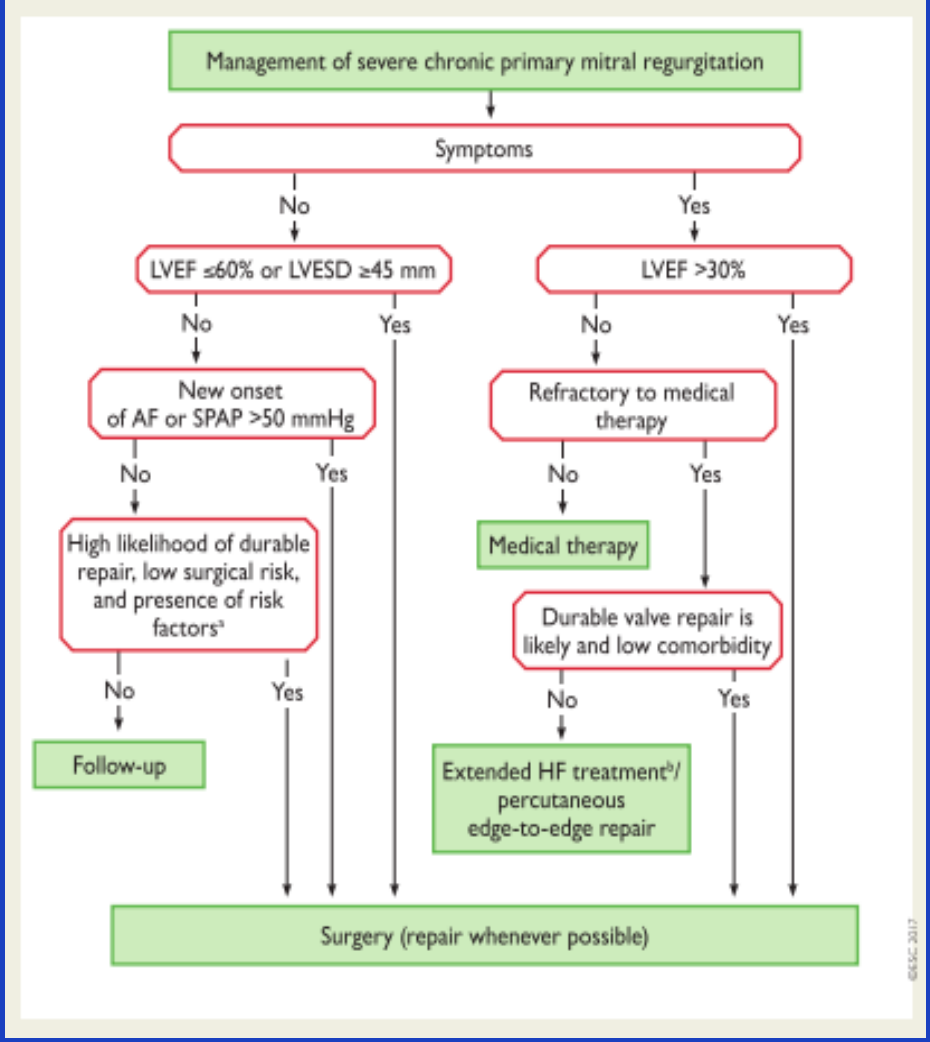
Classification of Severity of Mitral Regurgitation by Echo





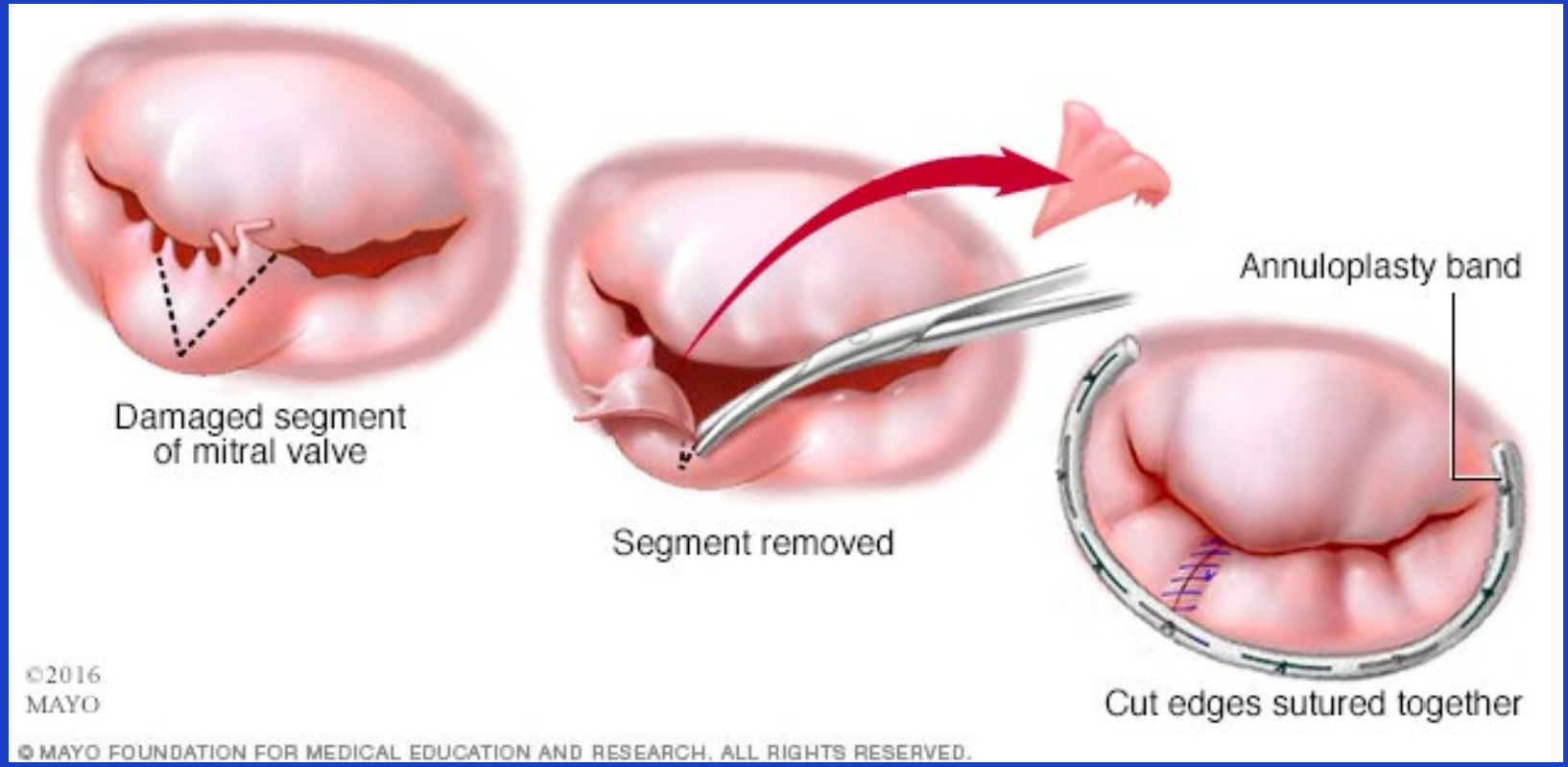
Classification of the Severity of Mitral Regurgitation				
Variable	**Mitral Regurgitation**			
	Mild	Moderate	Severe (stage C1)	Severe (stage C2)
Central jet % of LA	<20%	20-40%	>40%	>40%
Vena contracta	<3 mm	3-7 mm	>7 mm	>7 mm
Regurgitant volume	<30 mL	30-60 mL	>60 mL	>60 mL
Regurgitant orifice area	<0.2 cm^2	0.2-0.4 cm^2	>0.4 cm^2	>0.4 cm^2
LV enlargement (ESD)	None	None	None	≥40 mm
LV function	Normal	Normal	Normal	LVEF ≤60%
LA size	Normal	Mild to moderate	Moderate to severe	Moderate to severe

Management of Severe Mitral Regurgitation

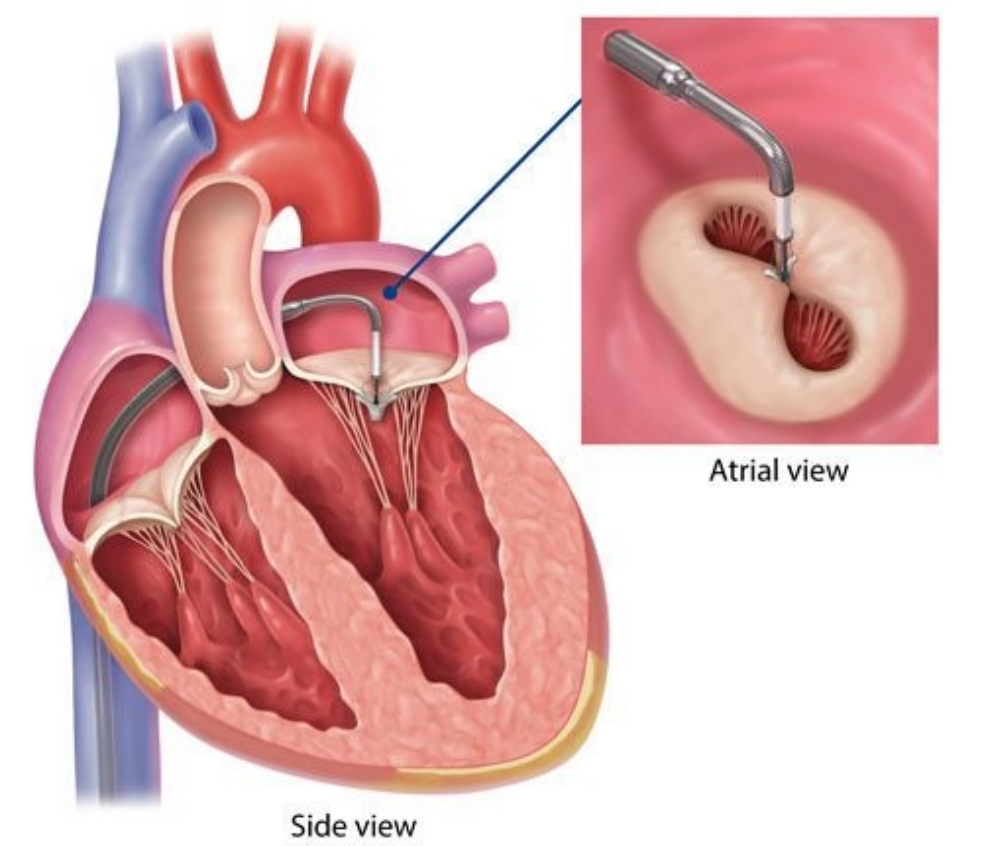


- **Medical Therapy**
  - Very limited role as it does not treat underlying process
  - Treat associated hypertension
- **Follow-up Assessment**
  - Mild regurgitation: Every 3 years
  - Moderate regurgitation: Every 1 year
  - Severe regurgitation: Every 6-12 months
  - Serial assessment of LV size and function is critical!!
- **Additional Diagnostic Testing**
  - Transesophageal echo if etiology or severity uncertain
  - Stress testing if uncertainty regarding symptoms and for athletic participation
  - Cardiac MR if echo imaging inadequate

Mitral Valve Repair

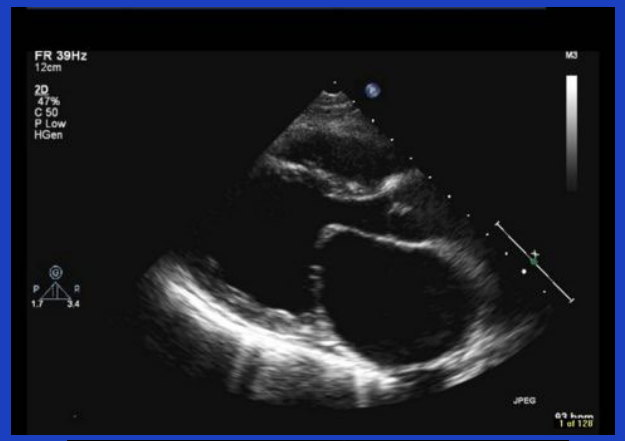


MitraClip Transcatheter Mitral Valve Repair



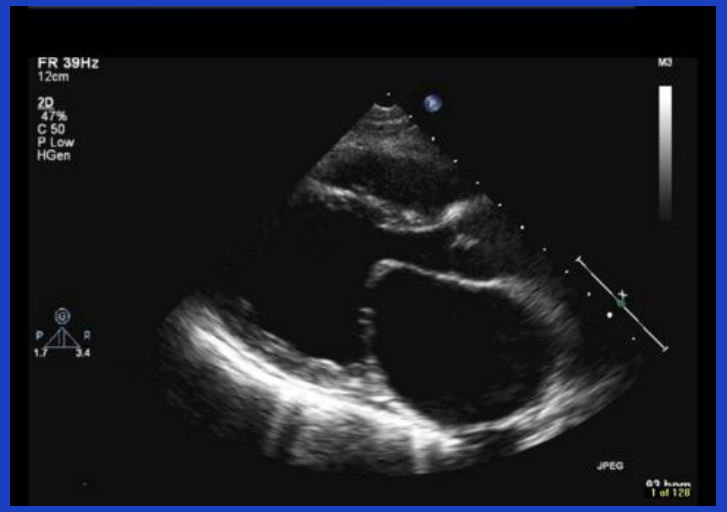
- **Catheter based edge-to-edge repair of mitral valve**
- **Principally useful in patients with *primary* severe mitral regurgitation**
- **Requires Heart Team evaluation**
- **FDA approved since 2013 for patients at prohibitively high surgical risk**

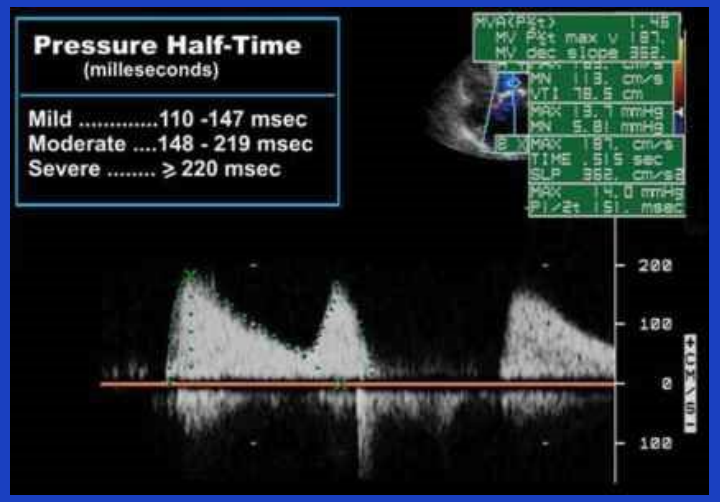
Mitral Stenosis



- **Rheumatic mitral valve disease**
  - Rare in US (~1%)
  - More common in certain immigrant populations
- **Physical exam**
  - Auscultation optimal with patient on left side, end-expiration, using the bell of stethoscope
  - Opening snap after S1 and diastolic rumble
  - Loud P2 with development of pulmonary hypertension
- **Diagnostic testing**
  - Transthoracic echo
  - TEE if severe to determine candidacy for percutaneous balloon mitral commissurotomy
  - Wilkins criteria (leaflet thickness, calcification, mobility and chordal involvement)

Classification of Mitral Stenosis Severity

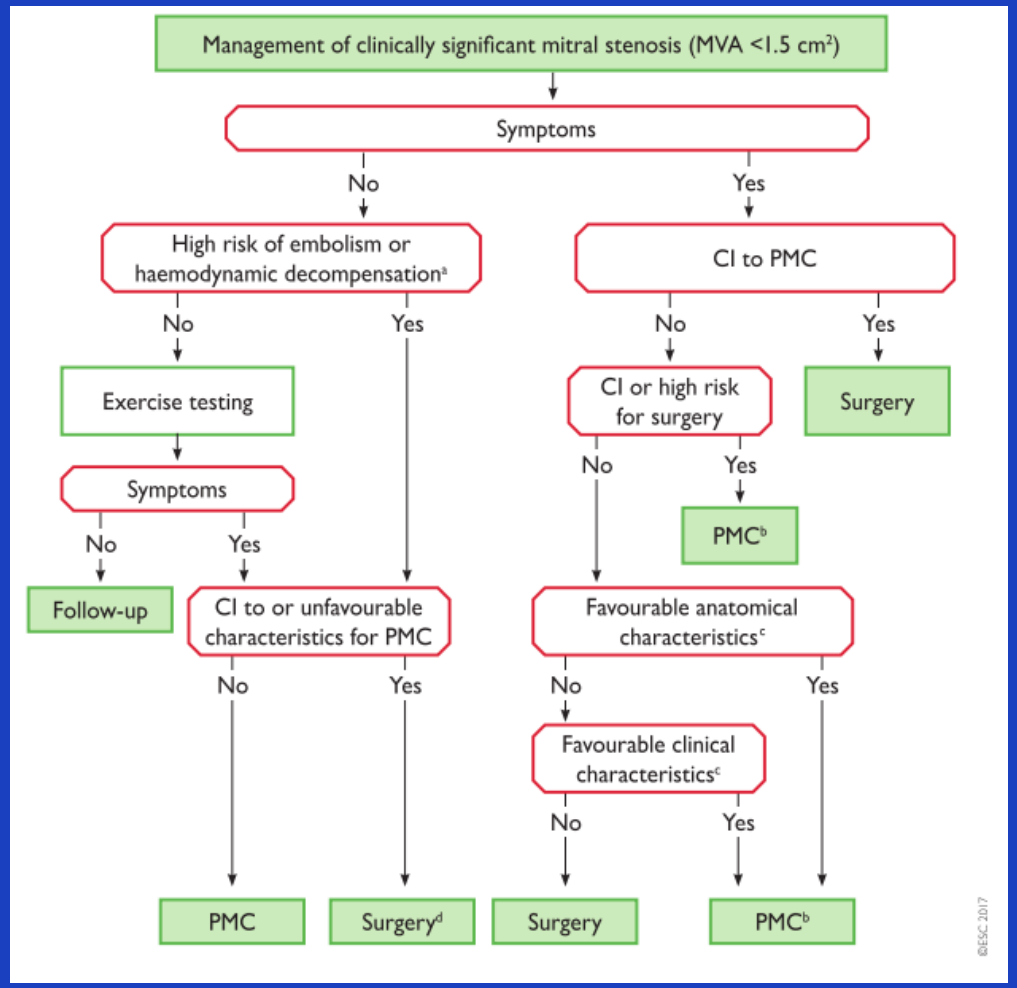




Classification of the Severity of Mitral Stenosis

Variable	Mitral Stenosis			
	Mild	Moderate	Severe	Very Severe
Resting mean gradient	<5	5-10	>10	>15
Pressure halftime	<110	110-150	151-220	>220
Mitral valve area	>2.0 cm^2	1.5-2.0 cm^2	1.0-1.5 cm^2	<1.0 cm^2
PA pressure	<30	<30 rest <50 stress	>30 rest	>50
LA enlargement	Mild to moderate	Mild to moderate	Severe	Severe

Management of Severe Mitral Stenosis



- **Medical therapy**
  - Secondary prevention with PCN for10 years or up to age 40 (whichever longer) following acute RF
  - Warfarin if AFib or systemic embolism
  - Good rate control of atrial fibrillation
- **Follow-up assessment**
  - Every 3 years if valve area >1.5 cm^2
  - Annually if valve area <1.5 cm^2 or elevated PA pressure
- **Percutaneous balloon mitral commissurotomy (PMC)**
  - Preferred treatment if favorable anatomy
  - TEE assessment for Wilkins criteria (≤8 favorable)
  - Should be considered in asymptomatic severe MS with pregnancy or high risk surgery

Athletic Participation with Valvular Heart Disease

Classification of Sports:

Dynamic, Static, and Impact

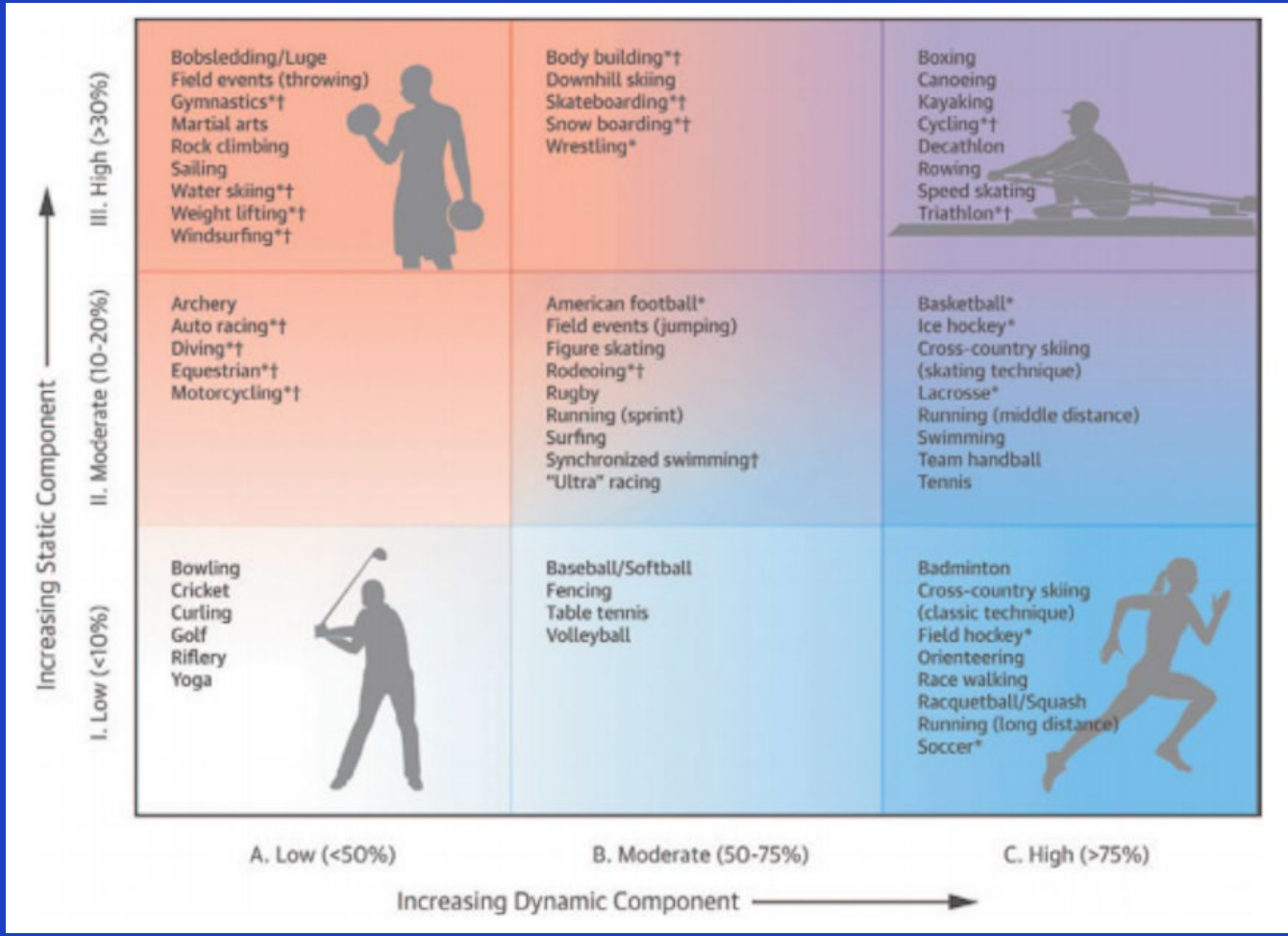


TABLE Sports According to Risk of Impact and Educational Background

	Junior High School	High School/College
Impact expected	American football Ice hockey Lacrosse Wrestling Karate/judo Fencing Boxing	American football Soccer Ice hockey Lacrosse Basketball Wrestling Karate/judo Downhill skiing Squash Fencing Boxing
Impact may occur	Soccer Basketball Field hockey Downhill skiing Equestrian Squash Cycling	Field hockey Equestrian Cycling Baseball/softball Gymnastics Figure skating
Impact not expected	Baseball/softball Cricket Golf Riflery Gymnastics Volleyball Swimming Track and field Tennis Figure skating Cross-country skiing Rowing Sailing Archery Weightlifting Badminton	Cricket Golf Riflery Volleyball Swimming Track and field Tennis Cross-country skiing Rowing Sailing Archery Weightlifting Badminton

Athletic Participation with Valvular Heart Disease
Aortic Stenosis

Parameter	Exercise Intensity		
	Low	Moderate	Intense
Severity of AS			
mild	✓	✓	✓
moderate	✓	✓	
severe	✓		
Bicuspid valve with aortic enlargement			
none	✓	✓	✓
4.0 - 4.5 mm	✓		
>4.5 mm			

Athletic Participation with Valvular Heart Disease
Aortic Regurgitation

Parameter	Exercise Intensity		
	Low	Moderate	Intense
Normal LV size/function			
mild-to-moderate	✓	✓	✓
severe	✓	✓	+/-
LV Dysfunction (EF <50% or LVESD >50 mm)	No competitive sports		
Aorta <4.5	✓ only if low risk for contact		
Aorta >4.5			

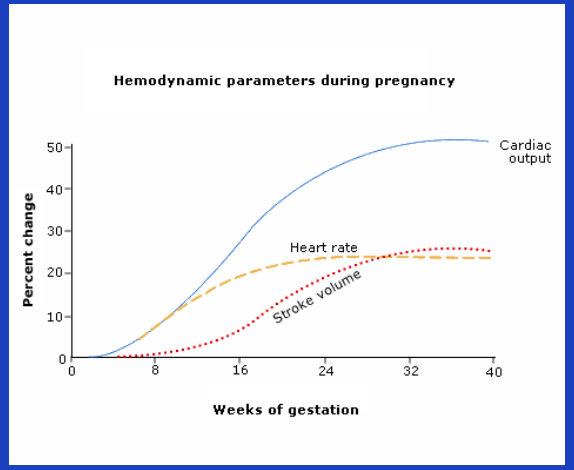
Athletic Participation with Valvular Heart Disease
Mitral Regurgitation

Parameter	Exercise Intensity		
	Low	Moderate	Intense
Normal LV size/function			
mild-to-moderate	✓	✓	✓
severe	✓	IA and IB only	
LV Dysfunction (EF <60% or LVESD >40 mm)	✓		
Atrial Fibrillation	Avoid bodily contact sports		

Athletic Participation with Valvular Heart Disease
Mitral Stenosis

Parameter	Exercise Intensity		
	Low	Moderate	Intense
Severity of Stenosis			
Mild	✓	✓	✓
Moderate (mean gradient <15 and normal PAP with exercise)	✓	✓	✓
Severe (valve area <1.5 cm^2)	✓		
Very severe (valve area <1.0 cm^2)			
Atrial fibrillation	Avoid bodily contact sports		

Valvular Heart Disease and Pregnancy



- **Cardiovascular Changes During Pregnancy**
  - Cardiac output ↑ 40-50%
    - ↑ stroke volume in first half of pregnancy
    - ↑ heart rate in second half of pregnancy
  - Plasma volume ↑ 40-50%
  - Systemic and pulmonary vascular resistance ↓ 20%
  - SBP no change, DBP ↓ 20%
  - Hypercoagulable state
- **Delivery**
  - Abrupt changes may occur due to uterine contraction, position, pain, anxiety, and hemorrhage

Valvular Heart Disease and Pregnancy

	Aortic Stenosis	Mitral Stenosis	Aortic and Mitral Regurgitation
Specific Risks	• CHF risk low if baseline asymptomatic • Dissection risk high if aorta ≥5.0 cm	• CHF 30-50% if severe MS • Atrial fibrillation may develop in ~10% with high risk for thromboembolism	• CHF risk low if class C1 • 25% risk of CHF if class C2

Pre-pregnancy Counseling	• Advise against if:
	  • Symptomatic
	  • EF <50%
	  • Aorta ≥5.0 cm
	• Consider pre-pregnancy stress testing
		• Advise against if:
		  • Symptomatic
		  • MVA ≤1.5 cm2
		  • PAS ≥50 mmHg
		• Consider PMC if MVA ≤1.5 cm^2 or PAS ≥50 mmHg
			• Advise against if:
			  • Symptomatic
			  • LV dysfunction
			• Consider pre-pregnancy mitral valve repair

Management during Pregnancy	• Echo every 1-2 months • Limit activity • Treat CHF if needed • Beta blockers if aortic dilation present • Consider balloon valvuloplasty in selected cases	• Echo monthly if MS ≥moderate in severity • Restrict activity • Beta blocker (metoprolol) • PMC if PAS rise ≥50 mmHg or NYHA class III-IV symptoms	• Echo each trimester • Treat hypertension if present
Delivery	C-section is symptomatic, severe AS, or aorta ≥4.5 cm	C-section if NYHA III-IV or PAS ≥50 mmHg	Vaginal with epidural C-section of aorta ≥4.5 cm

Antibiotic Prophylaxis for Valvular Heart Disease
A Simplified Approach

Necessary Only if *Both* High Risk Condition *and* High Risk Procedure Present

High Risk Conditions
Prosthetic heart valve
Prosthetic material used in valve repair
Prior history of endocarditis
Unrepaired cyanotic heart disease
Repaired congenital disease with residual shunt or prosthetic material
Transplanted heart with valve disease
Septal occlusion device first 6 months

High Risk Procedures
Dental work (including routine cleaning)
Respiratory tract involving biopsy or incision
Genitourinary tract if infection present
Gastrointestinal tract if infection present
Procedures on infection skin or musculoskeletal tissue
During implantation of prosthetic valves

Antibiotic Regimens for Endocarditis Prophylaxis

Situation	Agent	Single Dose
Oral	Amoxicillin	2 gm PO
Unable to take oral	Ampicillin	2. gm IV or IM
	or	
	Ceftriaxone	1 mg IV or IM
Oral – allergic to penicillin	Cephalexin	2 gm PO
	or	
	Clindamycin	600 mg PO
	or	
	Azithromycin	500 mg PO
Unable to take oral – allergic to penicillin	Ceftriaxone	1 gm IV or IM
	or	
	Clindamycin	600 mg IV or IM
	or	
	Vancomycin	15-20 mg/kg IV
Concern for MRSA	Vancomycin	15-20 mg/kg IV

10 Primary Care Pearls for VHD

1. Refer ALL *symptomatic* patients with severe valve dysfunction (stage D) for valve intervention
2. Medical therapy has a *very* limited role and does NOT alter the course of disease progression
3. Stage C patients with asymptomatic severe valve dysfunction require frequent assessment to detect the development of LV dysfunction (stage C2), as they may benefit from early intervention
4. Evaluate for aortic pathology in patients with aortic valve disease, especially if the valve is bicuspid
5. All first degree relatives of patients with bicuspid valve disease should be screened
6. Symptoms of valve disease are often insidious; consider stress testing in cases of uncertainty
7. Non-cardiac surgery: Regurgitant lesions well tolerated – spinal anesthesia preferred; severely stenotic lesions are high risk – GA preferred and prompt correction of arrhythmias is essential
8. Competitive athletics? No if symptomatic, LV dysfunction, or significant aortic enlargement; only low intensity for severe valve stenosis; restrict only high intensity for severe regurgitation
9. Pregnancy: Counsel against if symptomatic, LV dysfunction, aortic enlargement, or severe valve stenosis; regurgitant lesions are generally well tolerated. Strongly consider C-section for delivery
10. Follow-up: Echo every 3 years if mild, annually if moderate, and every 6-12 months if severe

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Slide Set and References

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Which of the following parameters is NOT an indication for mitral valve repair in a patient with chronic severe mitral regurgitation?

A. **Left ventricular enlargement**
B. **Left ventricular systolic dysfunction**
C. **Mitral regurgitant volume >60 mL**
D. **Development of pulmonary hypertension**
E. **New onset atrial fibrillation**

How frequently should a patient with asymptomatic severe aortic regurgitation with mild left ventricular enlargement undergo echocardiography?

A. Every 3 years
B. Every 2 years
C. Annually
D. Every 6 months
E. Every 3 months

Which of the following patients should NOT participate in competitive athletics?

A. An asymptomatic 18 year old with moderate bicuspid aortic stenosis, normal aortic size, and normal LV function wishing to play high school football

B. An asymptomatic 35 year old with severe mitral regurgitation, left ventricular enlargement, and a LVEF of 55% wishing to train for the Iron Man Triathlon

C. An asymptomatic 23 year old with severe aortic regurgitation, normal aortic and left ventricular size, and a LVEF of 55% wishing to join a competitive volleyball league

D. An asymptomatic 28 year with moderate mitral stenosis in sinus rhythm wishing to join a competitive soccer league

E. All of the above

Which of the following patients scenarios requires antibiotic prophylaxis?

A. A 32 year old with a bicuspid aortic valve undergoing a routine dental cleaning

B. A 65 year old with a bioprosthetic aortic valve undergoing excision and drainage of furuncle in the right axilla

C. A 42 year old male with a history of mitral valve repair undergoing cystoscopy for evaluation of asymptomatic microscopic hematuria

D. A 55 year old with a mechanical aortic valve undergoing upper endoscopy

E. All of the above