

AORTIC STENOSIS

Indicator	Mild	Moderate	Severe
jet velocity	2.6-2.9	3.0-4.0	>4.0
mean gradient	<25	25-40	>40
valve area	>1.5	1.0-1.5	<1.0
valve area index	>0.85	0.6-0.85	<0.6
velocity ratio	>0.5	0.25-0.5	<0.25

AORTIC REGURGITATION

Indicator	Mild	Moderate	Severe
jet width	<25% LVOT	25-65% LVOT	>65% LVOT
vena contracta	<0.3	0.3-0.6	>0.6
regurgitant volume	<30	30-59	≥60
regurgitant fraction	<30	30-49	≥50
ERO	<0.1	0.1-0.29	≥0.3
pressure half-time	>500	200-500	<200

MITRAL STENOSIS

Indicator	Mild	Moderate	Severe
valve area=220/ PHT (PHT=0.29 * DT)	1.5-2.5	1.0-1.5	<1.0
valve area index	1.5-2.3	1.0-1.5	<0.5
mean pressure gradient	<5	6-12	>12
end diastolic pressure gradient	2-6	7-10	>10

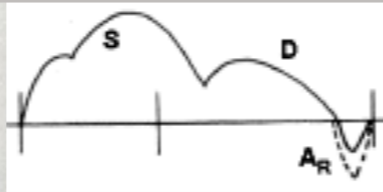
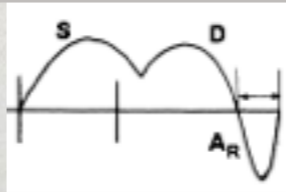
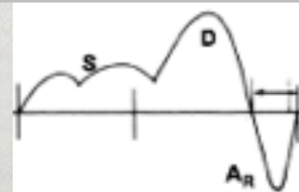
MV SCORE
0-8: EXCELLENT
9-12: INTERMEDIATE

Mobility (0-4)
Thickening (0-4)
Chordal involvement (0-4)
Calcification (0-4)

MITRAL REGURGITATION

Indicator	Mild	Moderate	Severe
jet area	<20% L Atrium	20-40% L Atrium	>40% L Atrium
vena contracta	<0.3	0.3-0.69	≥0.70
regurgitant volume	<30	30-59	≥60
regurgitant fraction	<30	30-49	≥50
ERO	<0.2	0.2-0.39	≥0.4

DIASTOLIC FUNCTION

Indicator	Normal	Stage I	Stage II	Stage III	Stage IV
E/A	0.9-1.5	<0.9	0.9-1.5	>1.8	>2.0
change in e/a with valsalva	no change	no change	reverses	E/A decreases but still > 1	no change
filling pressure (E/e', averaged)	<8	<8	9-12	>15	>15
prop velocity (V _p)	>50	<50	<50	<50	<50
IVRT (msec)	70-90	>90	60-90	<70	<70
decel. time	140-240	>240	140-200	<140	<130
septal e'	>10	<10	<8	<5	<5
lateral e'	>12	<10	<8	<8	<8
left atrial volume index	16-28	>28	>28	>35	>35
pulm vein flow					
Ar - A	<0	Varies	>30	>30	>30

CHAMBER DIMENSIONS

Chamber	Normal	Mild	Moderate	Severe
LVIDd (PLAX) (Men)	4.2-5.9	6.0-6.3	6.4-6.8	≥6.9
LVIDd (PLAX) (Women)	3.9-5.3	5.4-5.7	5.8-6.1	≥6.2
Septal and Posterior Wall Thickness (PLAX) (Men)	0.6-1.0	1.1-1.3	1.4-1.6	≥1.7
Septal and Posterior Wall Thickness (PLAX) (Women)	0.6-0.9	1.0-1.2	1.3-1.5	≥1.6
Left Atrial diameter (PLAX) (Men)	3.0-4.0	4.1-4.6	4.7-5.2	≥5.2
Left Atrial diameter (PLAX) (Women)	2.7-3.8	3.9-4.2	4.3-4.6	≥4.7
LA volume/BSA	22 ± 6	29-33	34-39	≥40

Aortic annulus	13 ± 1 mm/m ² 20-31 mm
Aortic sinuses	19 ± 1 mm/m ² 29-45 mm

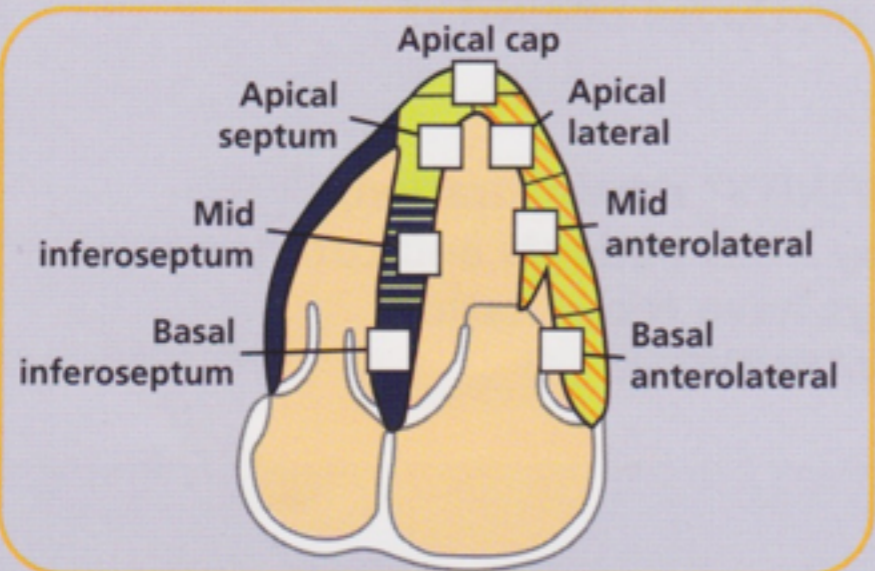
Sinotubular Junction	15 ± 1 mm/m ² 22-36 mm
Ascending Aorta	15 ± 2 mm/m ² 22-36 mm

RV subcostal wall thickness	≤0.5
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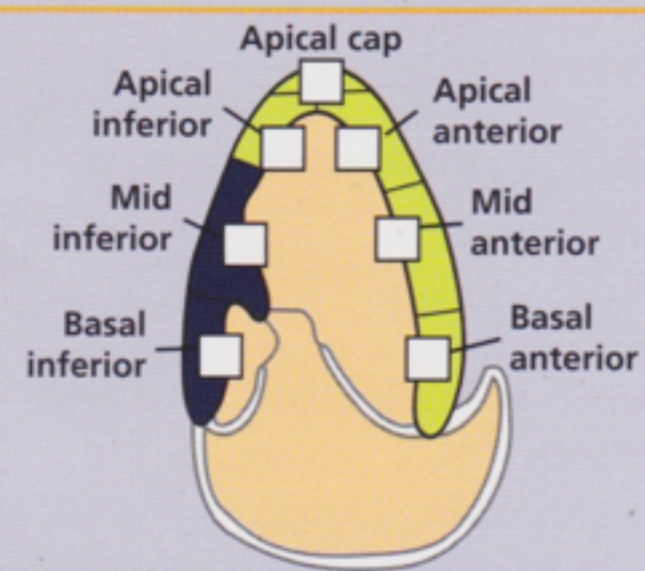
ECHO SEGMENTS

	RCA		RCA or CX
	LAD		LAD or CX
	CX		RCA or LAD

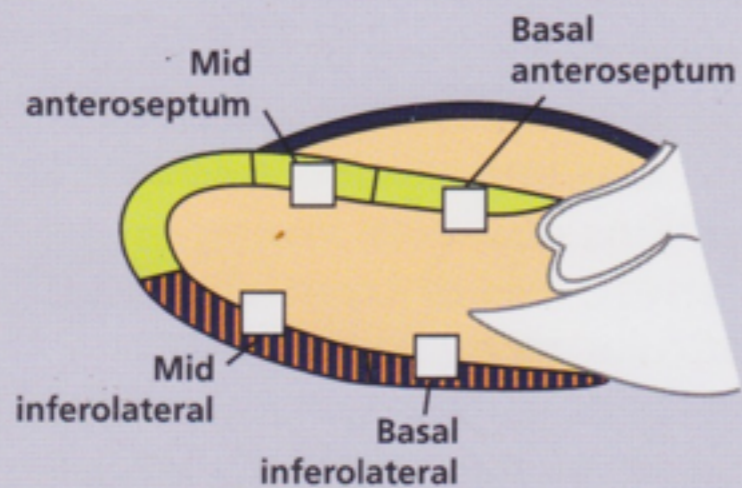
Apical 4-Chamber¹



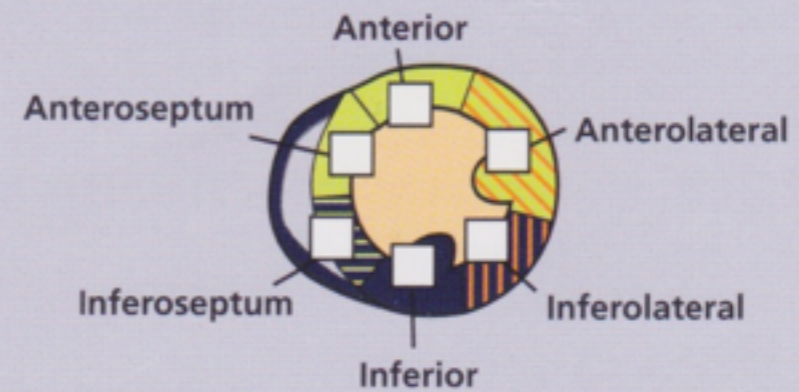
Apical 2-Chamber¹



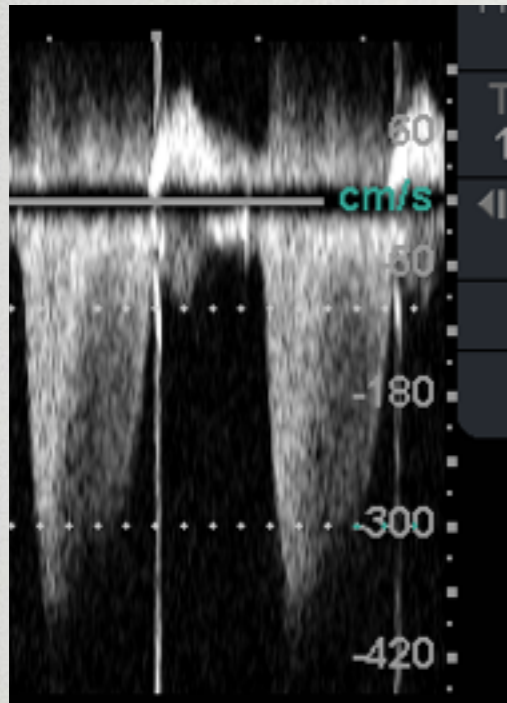
Parasternal Long Axis²



Parasternal Short Axis¹



HEMODYNAMICS, ETC.



IVC	Change with Sniff	RA Pressure (mmHg)
<21 mm	>50%	Normal (0-5)
Intermediate	Intermediate	8 (5-10)
>21 mm	<50%	15 (10-20)
Restrictive Filling		High
Tricuspid E/e' > 6		High
Diastolic flow predominance in hepatic vein		High

$$\Delta P = 4V^2$$

$$RVSP = TR \text{ gradient} + RAP$$

$$RVSP = SBP - \text{Systolic VSD gradient}$$

$$RVDP = LVDP - \text{Diastolic VSD gradient}$$

$$PASP = RVSP - PS \text{ gradient}$$

$$PAEDP = RAP + \text{End diastolic PR gradient}$$

$$\text{Mean PAP} = \text{Peak PR gradient}$$

$$LVSP = SBP + 70\% \text{ AS gradient}$$

$$LVSP = SBP - MR \text{ gradient}$$

$$LVEDP = DBP - \text{End Diastolic AR gradient}$$

$$PCWP = E/e' + 4 \text{ mmHg}$$

$$PCWP = SBP - MR \text{ gradient}$$

dP/dT. Measure time from I to 3 m/sec on MR jet. $dP/dT = 32/T_i$.
 >1200 mmHg/sec = Normal
 800-1200 => Mild LV dysfunction
 <800 => severe LV dysfunction

Elevated LVEDP:
 IVRT < 70 msec
 Short decel time (MV inflow)
 Restrictive E/A pattern
 Elevated D wave (PV inflow)
 Elevated PV inflow atrial reversal peak
 Elevated A dur (PV inflow)
 E/e' > 15
 B bump in MV m-mode

$$SV = CSA * VTI \quad CSA = (0.785) * (\text{diameter})^2$$

$$CO = VTI * CSA * HR$$

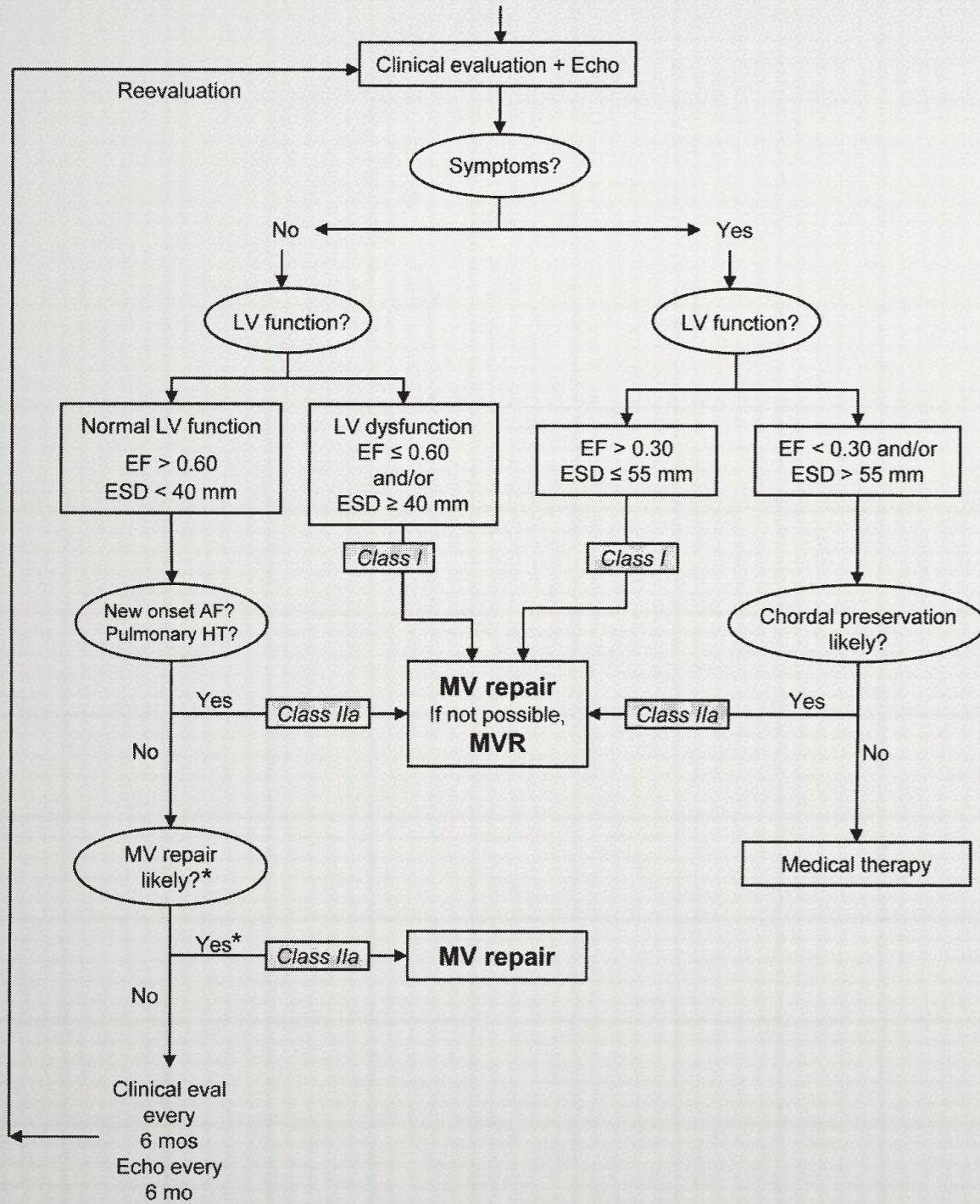
Shunt calculation:

$$Q_p/Q_s = (CSA_{RVOT})(TVI_{RVOT}) / (CSA_{LVOT})(TVI_{LVOT})$$

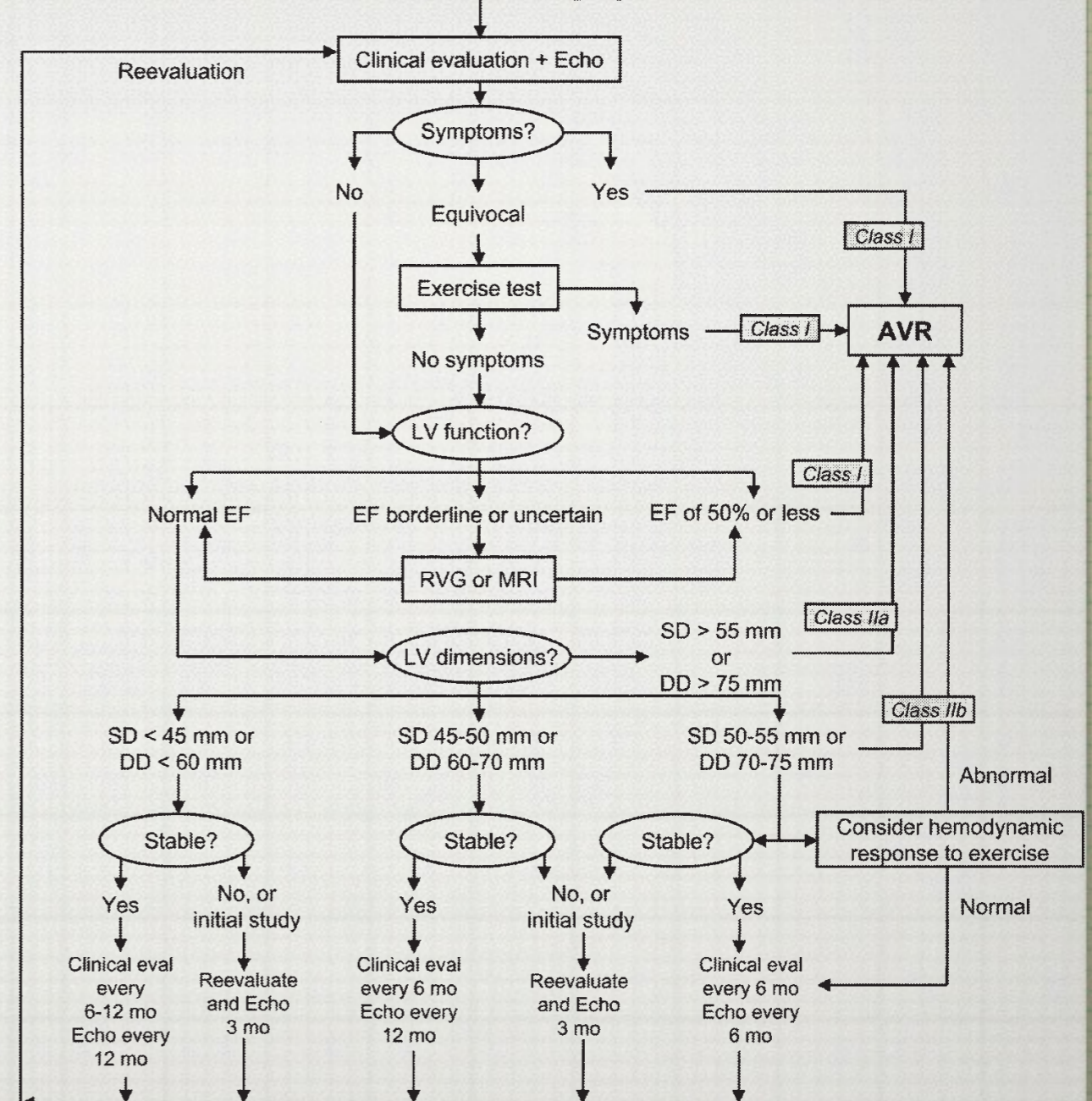
>1.5 => significant

INDICATIONS FOR SURGERY

Chronic Severe Mitral Regurgitation



Chronic Severe Aortic Regurgitation



SOURCES

- ❑ FEIGENBAUM 7TH EDITION
- ❑ AHA/ACC JOINT GUIDELINES FOR VALVE DISEASE 2006
- ❑ ASE RECOMMENDATIONS FOR EVALUATION OF THE RIGHT HEART, JULY 2010
- ❑ ASE RECOMMENDATIONS FOR CHAMBER QUANTIFICATION 2005