Technology in the Palm of your Hand

MS3 August 2017

Goals:

1. Pull together MS 1 & 2 data and bring it to the bedside
2. Appreciate the Power of the History and Physical
3. Learn the concept of correlating clinically
4. Become familiar with the multitude of ancillary cardiac testing that are available

Suggestions before our session

- Review lectures in Year 1 and 2 from Drs.' Robia, Samarel, McKiernan and Kristopaitis while enjoying your favorite beverage or my choice Ice Cream
- Spend 20 minutes starring at a Wigger's Diagram
- Go to your learning resource center and listen to the heart sounds tutorial or visit the Harvey manikin in the Med School
- Bring to class a patients history or exam that is memorable or was challenging
- Bring to class any weird ECG's you have run across

References:

Your personal choice for Internal Medicine textbook: Cecil's, Harrison's or other

Chapter on the Cardiac history and physical

www.blaufuss.org

Go thru their free heart sounds tutorial

S4

Low frequency, late diastolic sound heard at apex with bell. Best heard in left lateral decubitus position.

Deceleration of flow into the LV after the atrial contraction due to rise in the LV diastolic pressure

- Never normal
- Associated conditions:

LV hypertrophy

Systemic Hypertension, Aortic stenosis, Intrinsic issue like Hypertrophic CM

Ischemia, Infarcted/Scar non-compliance

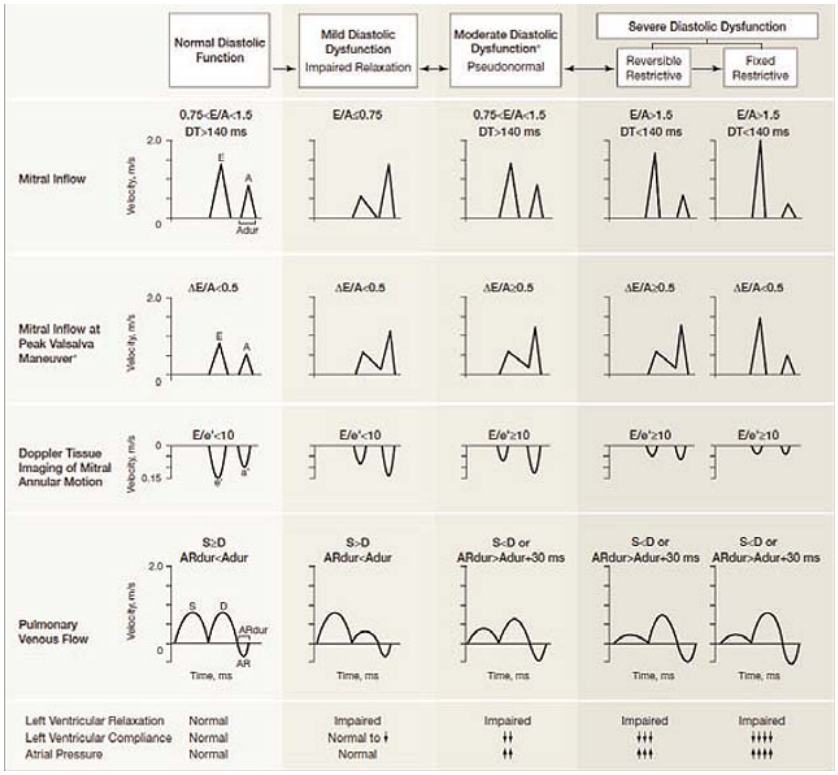
If your patient has symptoms (dyspnea most commonly) and their EF is normal they have :

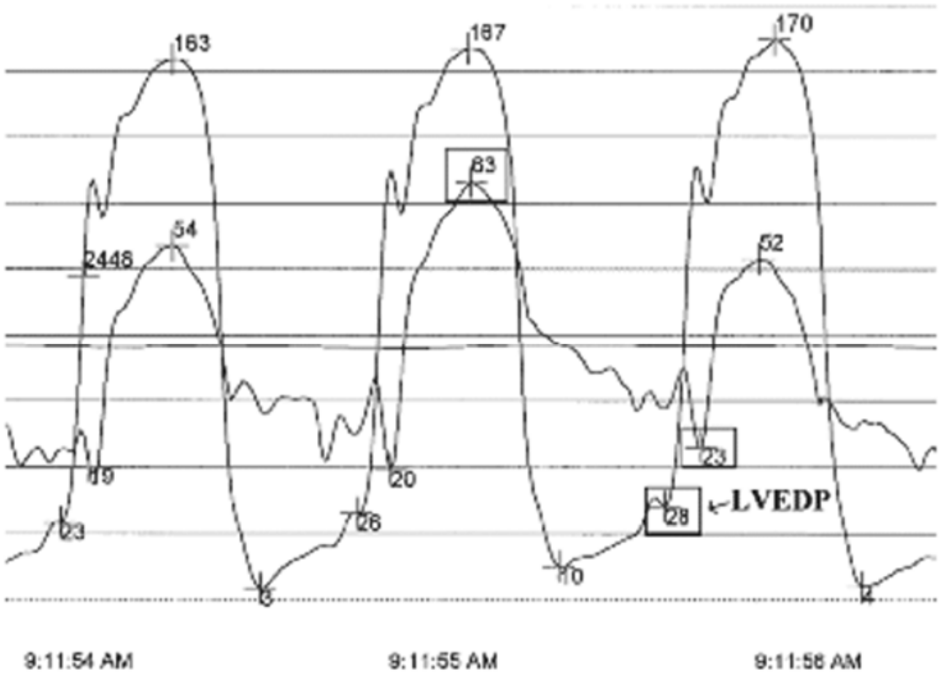
Heart Failure with Preserved Ejection Fraction (HFpEF)

(I think a more friendly name would be "***U***nha***p***py Heart D***ur***ing Dia***s***tole")(maybe ***UPURS***)

This would more likely be less stressful and ***treat their human spirit***

Imaging Correlation: Echo



Cath 

Pressures

Scenarios

A. 66 yr old female with exertional dyspnea on > 4 MET activities

Dx : hypertension x 8 years

BP 168/102, BMI 38.5

+S4, non-displaced, mildly sustained PMI

Predict: Echo, EF, BNP

B. 72 yr old with remote MI 6 yr ago presents for routine follow up

Dx: CAD, Dyslipidemia

BP 138/80, BMI 25.2

+S4, PMI in mid-clavicular line

ECG: shown

Predict Echo

S3

Low frequency, early diastolic sound heard at apex with bell, best in the LL decubitus position

Deceleration of flow early in diastole due to finding the LV still full most commonly due to impaired ejection.

Can be normal in youth/health due to the extremely high volume, rapid early filling phase

"Physiologic S3"

Associated with LV and reduced ejection fraction

If your patient has symptoms then it is called:

Heart Failure with Reduced Ejection Fraction (HFrEF)

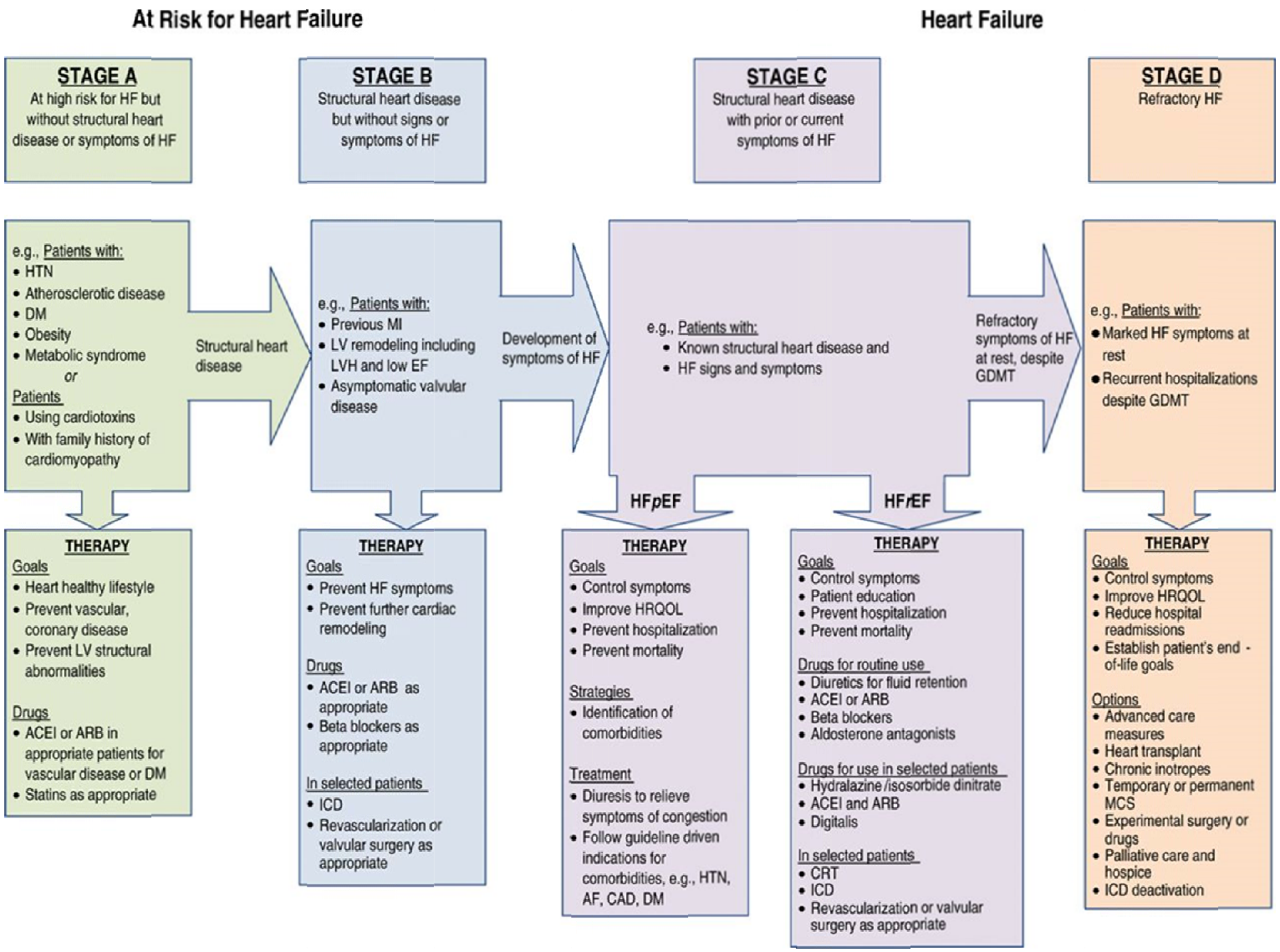
Associated with either ischemic or non-ischemic dilated cardiomyopathy

Assessment of EF:

PMI, precordial activity

Echo, CT, MRI, LV angiogram, Nuclear Medicine (SPECT, MUGA)

Stage and functional class:


At Risk for Heart Failure
Heart Failure
STAGE A
At high risk for HF but without structural heart disease or symptoms of HF
STAGE B
Structural heart disease but without signs or symptoms of HF
STAGE C
Structural heart disease with prior or current symptoms of HF
STAGE D
Refractory HF
e.g., Patients with:
• HTN
• Atherosclerotic disease
• DM
• Obesity
• Metabolic syndrome
or
Patients
• Using cardiotoxins
• With family history of cardiomyopathy
Structural heart disease
e.g., Patients with:
• Previous MI
• LV remodeling including LVH and low EF
• Asymptomatic valvular disease
Development of symptoms of HF
e.g., Patients with:
• Known structural heart disease and
• HF signs and symptoms
Refractory symptoms of HF at rest, despite GDMT
e.g., Patients with:
• Marked HF symptoms at rest
• Recurrent hospitalizations despite GDMT
HFpEF
HFrEF
THERAPY
Goals
• Heart healthy lifestyle
• Prevent vascular, coronary disease
• Prevent LV structural abnormalities
Drugs
• ACEI or ARB in appropriate patients for vascular disease or DM
• Statins as appropriate
THERAPY
Goals
• Prevent HF symptoms
• Prevent further cardiac remodeling
Drugs
• ACEI or ARB as appropriate
• Beta blockers as appropriate
In selected patients
• ICD
• Revascularization or valvular surgery as appropriate
THERAPY
Goals
• Control symptoms
• Improve HRQOL
• Prevent hospitalization
• Prevent mortality
Strategies
• Identification of comorbidities
Treatment
• Diuresis to relieve symptoms of congestion
• Follow guideline driven indications for comorbidities, e.g., HTN, AF, CAD, DM
THERAPY
Goals
• Control symptoms
• Patient education
• Prevent hospitalization
• Prevent mortality
Drugs for routine use
• Diuretics for fluid retention
• ACEI or ARB
• Beta blockers
• Aldosterone antagonists
Drugs for use in selected patients
• Hydralazine/isosorbide dinitrate
• ACEI and ARB
• Digitalis
In selected patients
• CRT
• ICD
• Revascularization or valvular surgery as appropriate
THERAPY
Goals
• Control symptoms
• Improve HRQOL
• Reduce hospital readmissions
• Establish patient's end-of-life goals
Options
• Advanced care measures
• Heart transplant
• Chronic inotropes
• Temporary or permanent MCS
• Experimental surgery or drugs
• Palliative care and hospice
• ICD deactivation

New York Heart Association (NYHA) Classification of Heart Failure

Class	Patient Symptoms
Class I (Mild)	No limitation of physical activity. Ordinary physical activity does not cause undue fatigue, rapid/irregular heartbeat (palpitation) or shortness of breath (dyspnea).
Class II (Mild)	Slight limitation of physical activity. Comfortable at rest, but ordinary physical activity results in fatigue, rapid/irregular heartbeat (palpitation) or shortness of breath (dyspnea).
Class III (Moderate)	Marked limitation of physical activity. Comfortable at rest, but less than ordinary activity causes fatigue, rapid/irregular heartbeat (palpitation) or shortness of breath (dyspnea).
Class IV (Severe)	Unable to carry out any physical activity without discomfort. Symptoms of fatigue, rapid/irregular heartbeat (palpitation) or shortness of breath (dyspnea) are present at rest. If any physical activity is undertaken, discomfort increases.

Physical activity	MET
Light intensity activities	**< 3**
sleeping	0.9
watching television	1.0
writing, desk work, typing	1.5
walking, 1.7 mph (2.7 km/h), level ground, strolling, very slow	2.3
walking, 2.5 mph (4 km/h)	2.9
Moderate intensity activities	**3 to 6**
bicycling, stationary, 50 watts, very light effort	3.0
walking 3.0 mph (4.8 km/h)	3.3
calisthenics, home exercise, light or moderate effort, general	3.5
walking 3.4 mph (5.5 km/h)	3.6
bicycling, <10 mph (16 km/h), leisure, to work or for pleasure	4.0
bicycling, stationary, 100 watts, light effort	5.5
sexual activity	5.8[10]
Vigorous intensity activities	**> 6**
jogging, general	7.0
calisthenics (e.g. pushups, situps, pullups, jumping jacks), heavy, vigorous effort	8.0
running jogging, in place	8.0
rope jumping	10.0

Scenario:

48 yr old with 4 months of progressive SOB now having symptoms with ADL's and waking up with a "smothering" sensation.

Denies chest pain

Exam: 108/88, 106, 22

JVP 8 cm at 45 degrees, Bibasilar rales, PMI in Anterior Axillary Line with "Gallop"

16 cm liver and 3 + edema

Diagnosis

Prognosis

Treatment

"I want to rule out CAD"

What is your goal?

To detect "any" then do an autopsy (A bit aggressive, but very accurate)

Or consider a coronary artery CT scan

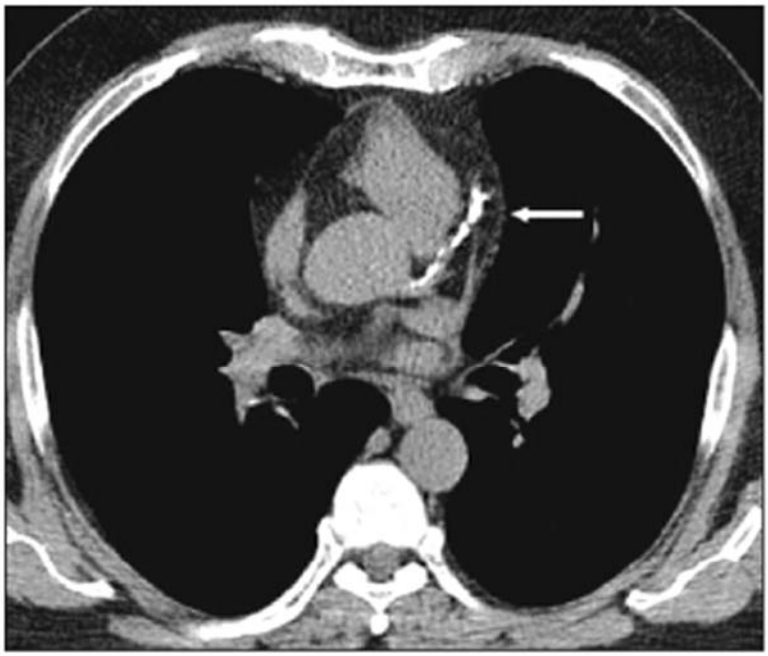
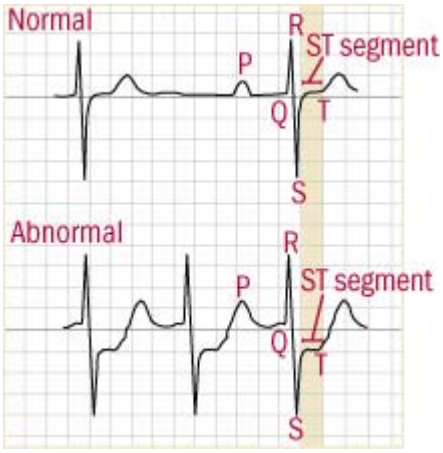


Fig. 1 - Calcification of the anterior descending artery detected on ultrafast tomography in an asymptomatic man (arrow).

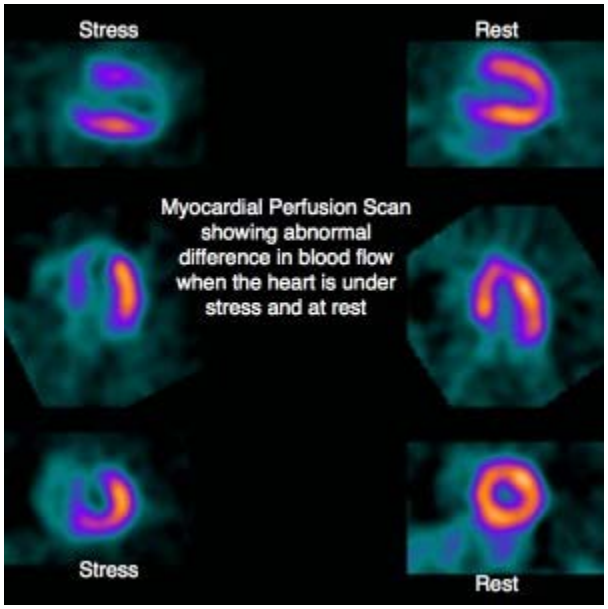
To detect "significant":

Exercise treadmill stress test using ECG as marker for ischemia



IF ECG stinks (LVH with strain, LBBB, Pacemaker) then use imaging

Nuclear Medicine myocardial perfusion ("Thallium")



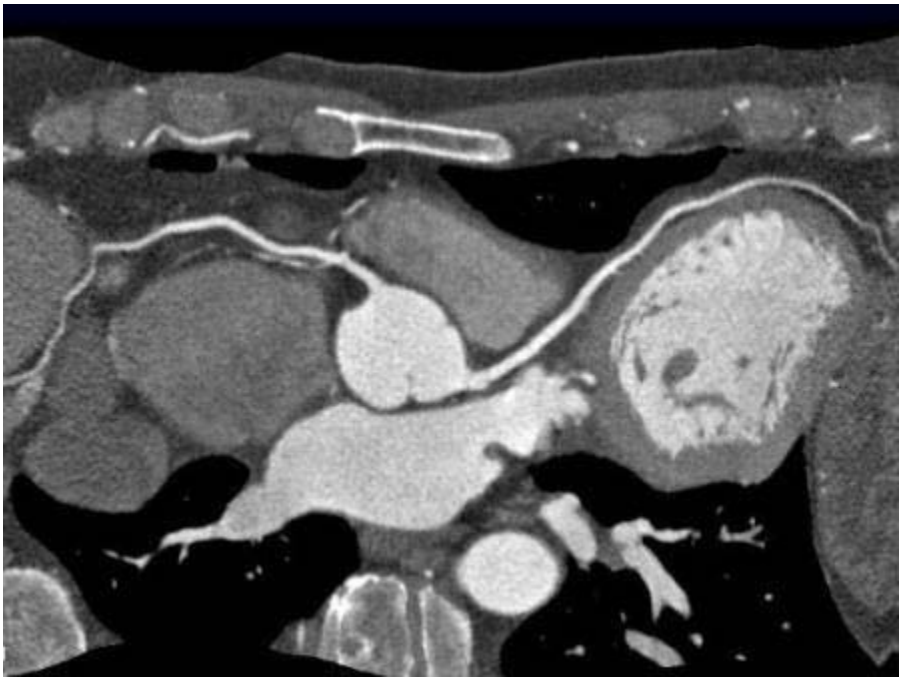
Echocardiography (Looks at contractility when myocardium become ischemic)

What if can't exercise

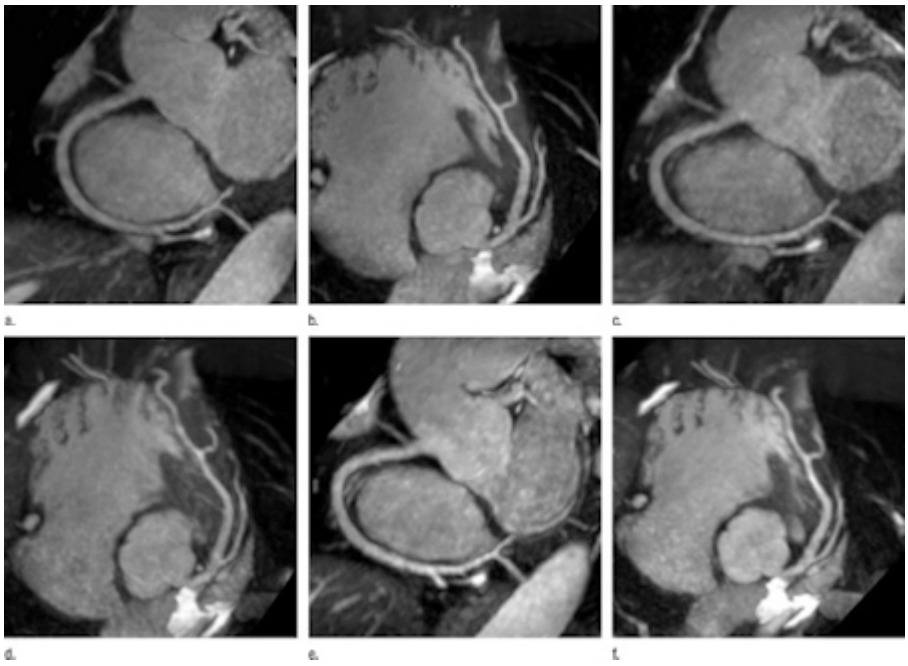
Pharmacologic options:

- Simulate the HR and BP response to exercise with Dobutamine and attempt to create ischemia
- Provide one of the material responsible for dilating the coronary arteries (_____) and take a look at the coronary blood flow using a traceable substance (Radioactive pharmaceutical: "Myoview", "Cardiolite")

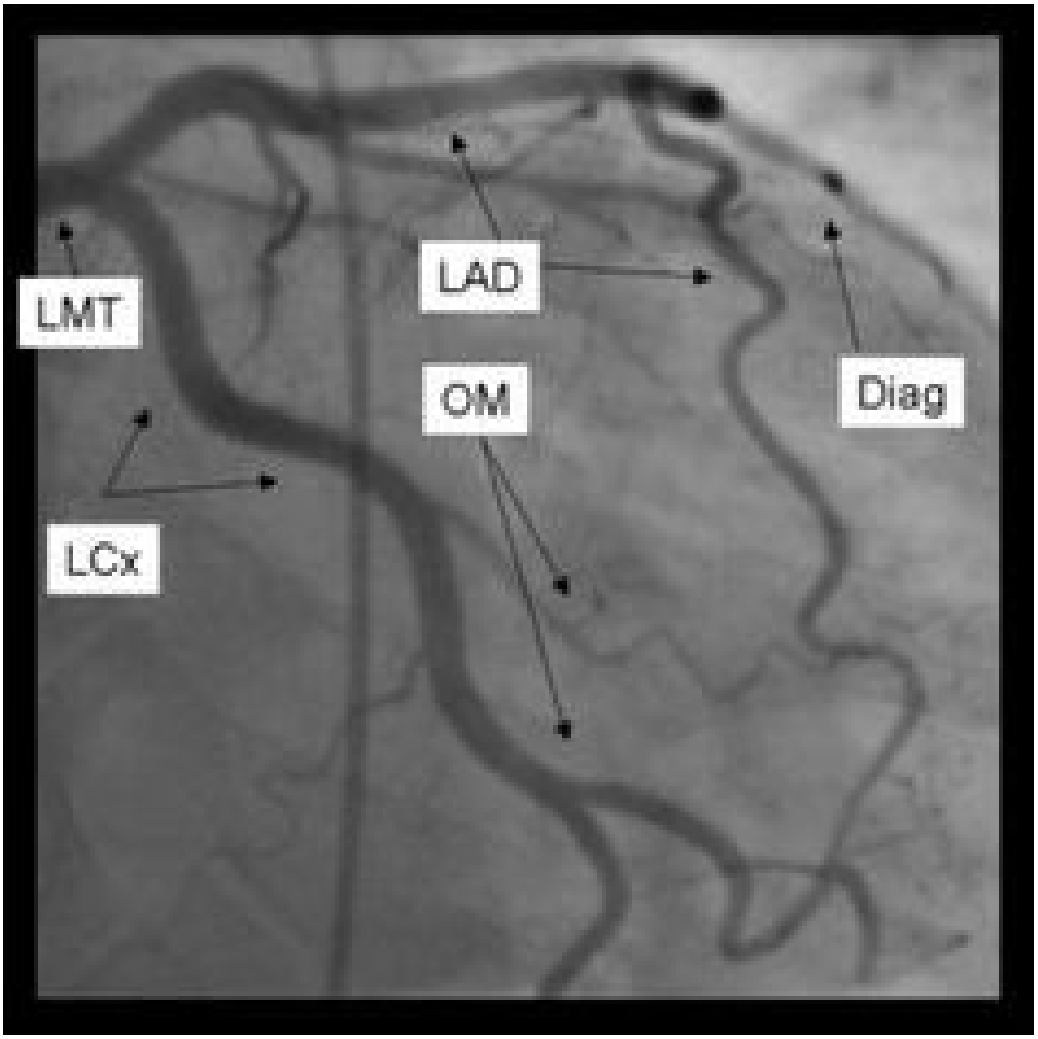
CT



MRI

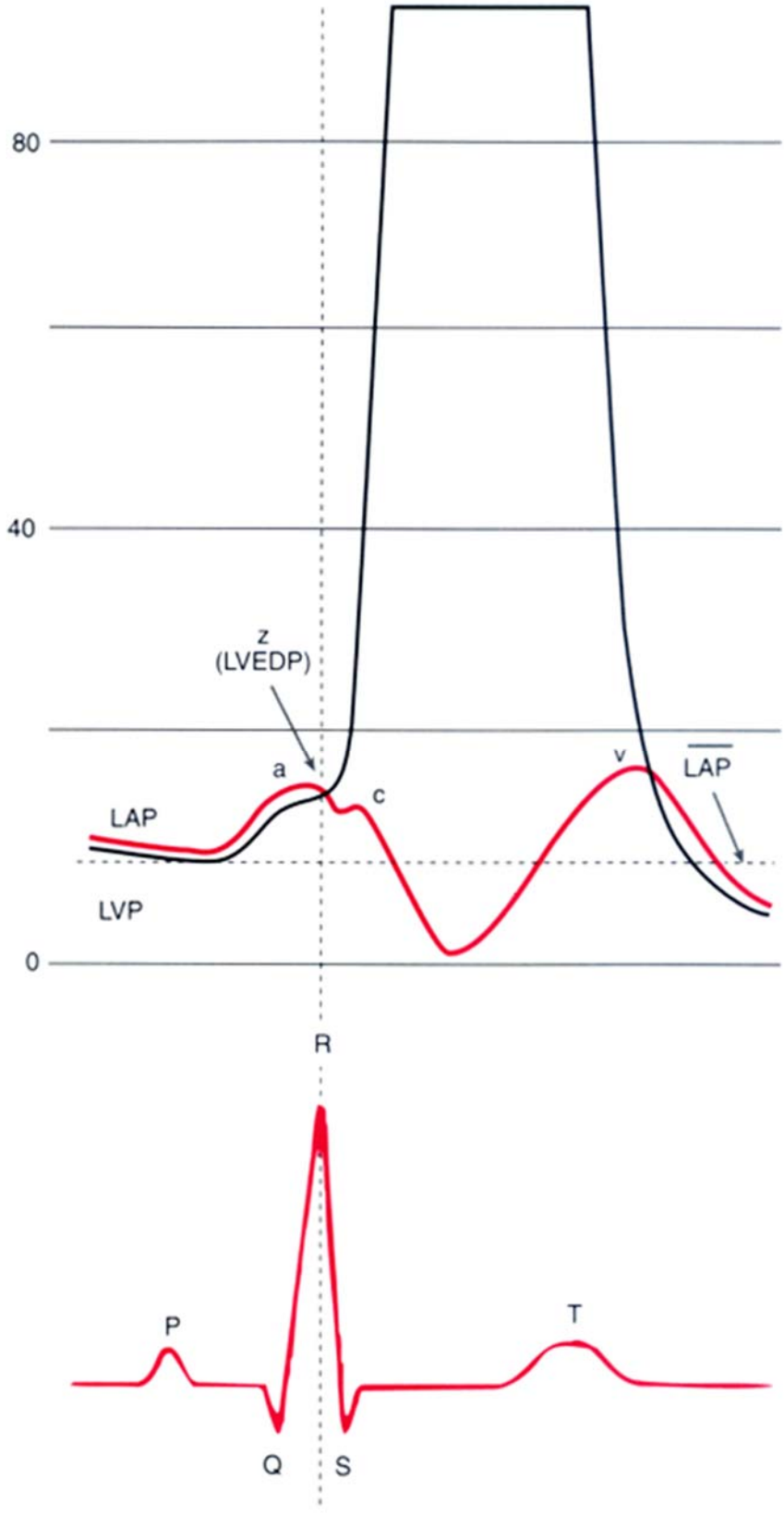


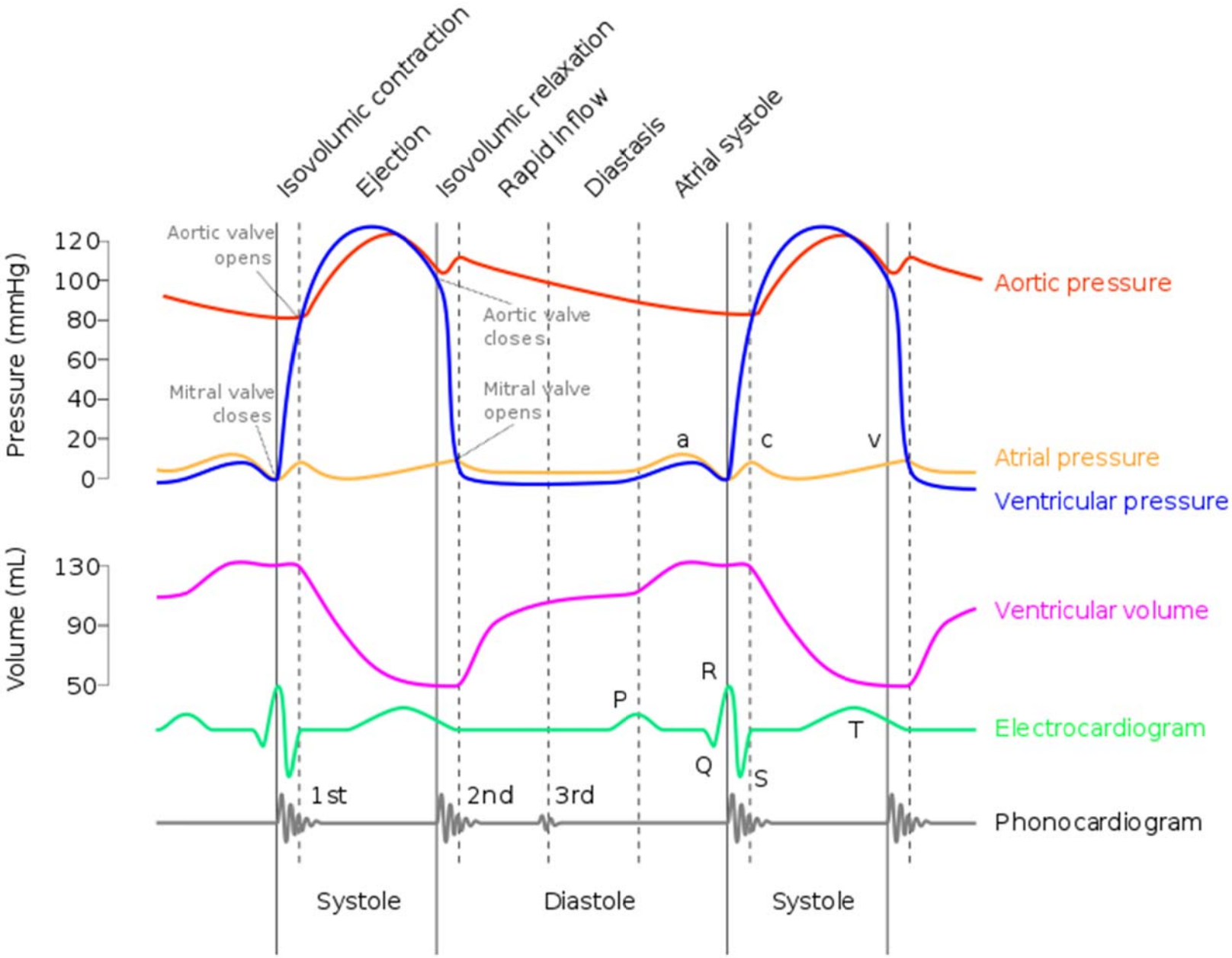
Coronary Arteriography

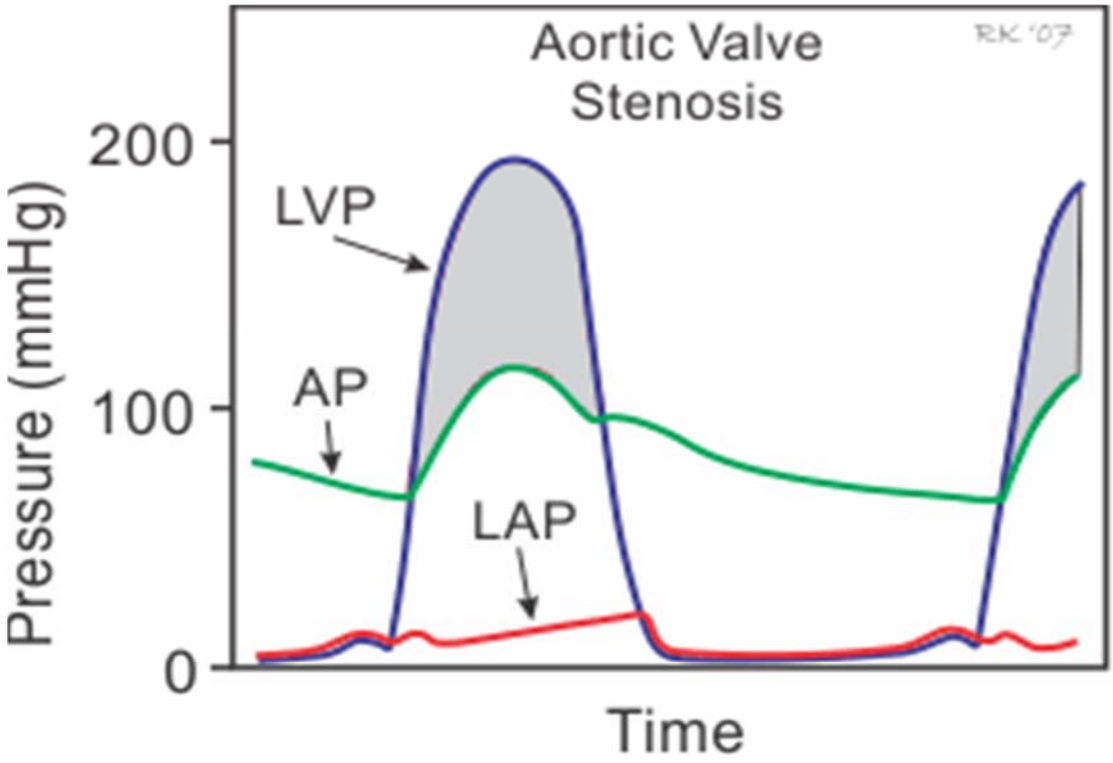


Systolic Murmur: AS versus MR

	Aortic Stenosis	Mitral Regurgitation
Overload	Pressure	Volume
PMI	Sustained, not displaced	Enlarged, displaced laterally
Pulse	Potentially tardus and brevis	Normal
Extra Heart Sounds	S4 Potentially Ejection Click	S3, diastolic rumble


80
40
0
z
(LVEDP)
a
c
v
LAP
LAP
LVP
R
P
T
Q
S


Isovolumic contraction
Ejection
Isovolumic relaxation
Rapid inflow
Diastasis
Atrial systole
Pressure (mmHg)
120
100
80
60
40
20
0
Aortic valve opens
Aortic valve closes
Mitral valve closes
Mitral valve opens
a
c
v
Aortic pressure
Atrial pressure
Ventricular pressure
Volume (mL)
130
90
50
Ventricular volume
R
P
T
Q
S
Electrocardiogram
1st
2nd
3rd
Phonocardiogram
Systole
Diastole
Systole



During ventricular ejection, LVP exceeds AP (gray area, pressure gradient generated by stenosis). *Abbreviations:* LAP, left atrial pressure; LVP, left ventricular pressure; AP, aortic pressure.

Aortic Insufficiency

Blowing quality, heard with diaphragm along sternal border. Heard better when vertical and leaning forward

Never normal

Associated with lots of variable conditions

- Aortic dissection
- Aortic root dilation
- Endocarditis
- Bicuspid aortic valve

Your History

&

Physical Exam in setting of chest pain

History and Vote:

Diamond and Forrester & CASS
NEJM 300:1350-1358, 1979 & Circ 64:360,1981

AGE	Nonanginal		Atypical		Typical	
	Men	Women	Men	Women	Men	Women
30-39	4	2	34	12	76	26
40-49	13	3	51	22	87	55
50-59	20	7	65	31	93	73
60-69	27	14	72	51	94	86