Introduction to Cardiology

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Perhaps you’ll want this printed on your next T-shirt?

I LOVE CARDIOLOGY

Cardiovascular System Overview
Symptoms
History
PE
Diagnostic Studies
Cardiology practice question

- A 75 y/o retired publisher presents for a routine check up. He has a h/o CHF, HTN, and hyperlipidemia. He is doing well and taking his meds as prescribed. On physical exam of the CV system, which of the following would you expect to find?

**Choices:**

A. PMI in 5th ICS, left MCL
B. PMI in 5th ICS, left anterior axillary line
C. PMI in 3rd, ICS, left MCL
D. PMI in 8th ICS, left anterior axillary line

**Answer:**

A. PMI in 5th ICS, left MCL
B. **PMI in 5th ICS, left anterior axillary line**
C. PMI in 3rd, ICS, left MCL
D. PMI in 8th ICS, left anterior axillary line
Common Symptoms:

- Chest pain/angina pectoris
- Dyspnea
- Syncope/pre-syncope/dizziness
- Fluid retention/edema/CHF
- Palpitations
- Cough

Chest Pain/Angina Pectoris:

- Onset/Provoking or relieving factors
- Quality
- Radiation of pain
- Severity and site
- Timing/duration
- Associated symptoms: SOB, DOE, N, V, diaphoresis

Dyspnea:

- Exertional (may be anginal equivalent)
- Paroxysmal Nocturnal Dyspnea
- Orthopnea
- Dyspnea at rest
Syncope/pre-syncope/dizzy:

- Results from decreased cerebral blood flow
- May be due to arrhythmia (e.g., brady or tachy, heart block, runs of VT), low BP, or low cardiac output
- Test with BP, EKG, Holter monitor, or tilt-table test (r/o vasovagal response)

Fluid Retention:

- Results from reduced cardiac function
  - Often from elevated R-sided pressures in the heart
- Appears as dependent (pedal or other) edema
- Commonly associated with CHF

Palpitations:

- “Awareness of the heartbeat”
- Rate changes
- Regular vs. irregular beats
- Anxiety secondary to increased catecholamine
- Frequently found with atrial/ventricular arrhythmias
Cough:
- Most likely pulmonary in etiology
- Cardiac association mostly dry or non-productive
- Seen in heart failure and ACE-inhibitor medication use

History:
- HPI
- Past Medical History
  - Rheumatic fever, thyroid disease, DM, congenital or previous heart disease
- Atherosclerosis Risk Factors
  - Fam hx, DM, HTN, smoking, lipids, male
  - Age, stress/Type A, sedentary, obesity, too few fruits/veggies, too much ETOH

Physical Examination:
- BP Readings
  - Proper technique
  - Orthostatic changes (>20mm syst. drop)
  - Pulse pressure: difference between systolic and diastolic readings
  - (widened suggests large stroke volume)
  - (narrowed suggests small stroke volume)
Peripheral Pulses:

- Rate: fast/slow
- Rhythm: regular/irregular
- Gradation: 1-4; 2 = normal
- Palpable vibration = thrill
- Audible murmur heard over blood vessel = bruit

Peripheral Pulses – cont.

- Bifed/bisferiens pulse: beating 2 X in systole as seen in HOCM, AR
- Dicrotic pulse: exaggerated, early diastolic wave seen in HF
- Pulses alternans: alternating strong/weak pulse force seen in HF
- Paradoxical pulse: >10mmHg drop in systolic BP during inspiration in Obstructive Lung Dz and tamponade

Peripheral Pulses – cont.

- Carotid
- Brachial
- Radial
- Femoral
- Dorsalis Pedis – top (dorsum) of foot
- Posterior Tibialis – medial malleolus
Abdominal Aorta:

- Width is especially important in males after age 65, especially with HTN, smoking, renal dz, and CAD
- Palpate for width (< 3 cm normal)
- Listen for bruits over abdominal aorta, renal arteries, iliac arteries

Jugular Venous Pulsations:

- Provide information about central venous pressures and right-heart function
- Positive HJR (>1 cm increase in JVP with sustained pressure over liver) in CHF
- 'a' wave = atrial contraction (giant in TS)
- 'v' wave = ventricular contraction (large in TR)

Lungs:

- Mostly for respiratory disease evaluation
- Rales/crackles at bases commonly found in congestive heart failure
- Wheezing occasionally in L heart failure
- Pleural effusions in CHF
Cardiac Auscultation:

- Stethoscope
  - B e l l = low frequency sounds: ventricular filling as heard in MS – left lateral position
  - D i a p h r a g m = high frequency sounds: used for most murmurs as heard in AR – sitting up

First Heart Sound – S1

- AKA: “lub”; shorter in duration
- Results from closure of mitral and tricuspid valves: loud in MS, diminished in severe LV dysfunction

Second Heart Sound – S2

- AKA: “dub”; longer in duration
- Closure of aortic and pulmonic valves
  - + split with inspiration (physiologic)
  - A S D results in constantly/fixed split S2
  - L B B B, L V H, A S can all cause reversed splitting: split during e x p i r a t i o n
Third Heart Sound – S3/gallop

- Early, rapid LV filling (normal in young)
- Associated with LV overload conditions or dilatation (e.g., CHF)
- Heard best at apex in LL decubitus position with bell (low pitched sound)
- “Kentucky” sounding

Fourth Heart Sound – S4

- Results from vigorous atrial contraction into resistant/stiff LV
- Often heard with LVH or MI
- Heard best at apex in LL decubitus position with bell
- “Tennessee”-sounding
- Never heard in atrial fibrillation

Other Heart Sounds

- Midsystolic Click – MVP
  - Heard best at apex and LLSB with diaphragm (high-pitched sound)
  - Body position often varies the sound
- Opening Snap – MS
  - Heard best medial to apex and along LLSB with diaphragm
Heart Murmurs

- Systolic – more common with no disease present
- Diastolic – always disease-related
- Graded I-VI/VI or 1-6/6
  - I: barely audible; II, III: getting louder
  - IV: associated with thrill
  - V: heard with edge of stethoscope
  - VI: heard with stethoscope off chest

Systolic Murmurs

- Most common: crescendo/decrescendo (aka ‘diamond shape’) found in normal hearts, AS, PS
- Innocent flow murmur: I, II/VI, early systole; 80% of kids; pregnant females (aka ‘mammary souffle’); decreased with sitting up: no problem

Systolic Murmurs cont.

- Holo or pansystolic, and/or >III/VI: almost always cardiac pathology involved
- Most common = AV valve regurgitation/ (MR or TR) and VSD
Diastolic Murmurs

- Always abnormal and associated with some pathology
- Most common is high-pitched, decrescendo murmur = PR, AR
- Diastolic ‘rumble’ = e.g. MS

Continuous Murmurs

- Heard throughout systole and diastole

- Patent Ductus Arteriosus = most common (aka ‘to-and-fro’ murmur); has “machinery-like” quality

Diagnostic Studies

- EKG/ECG – electrocardiogram, ambulatory
- ECHO – echocardiogram or stress ECHO
- Stress Testing – exercise, nuclear, pharmacologic
- Nuclear Imaging
- EPS – electrophysiologic studies
- Calcium Scoring/CCS/EBCT
- MRI/MRA
- Cardiac Catheterization/Angiography
EKG/ECG - electrocardiogram

- 12-lead EKG – baseline, immediate, low cost, non-invasive
- Holter monitor – 24 hours
- Event recorder – longer (days/weeks), may be implanted in patient (months)
- SAECG – signal averaged ECG: look for “late potentials”

Holter Monitor and Event Recorder

ECHO - echocardiogram

- Ultrasound of heart: good for anatomy and structural problems; can be done at bedside
- Pulsed Doppler: investigates blood flow
- Color-flow: shows regurgitant flow
- TEE: transesophageal-good for posterior structures (eg LA thrombi or MV vegetations)
- Stress ECHO: good for ischemia (hypokinetic wall motion), after MI, or for view of valves and chamber size
**ECHO allows exact measurements**

**Test of autonomic nervous system functioning:**
- Tilt-table testing: often utilized to R/O a vasovagal response as a cause of syncope; this test should be performed prior to more invasive testing

**Nuclear Imaging**
- Thallium XST (also sestamibi and tetrafosmin)-good for detecting perfusion defects/IHD or scar tissue
- CT/SPECT/PET: vessel dz, myocardial perfusion, wall motion
- CCS/EBCT: electron beam; +/- calcifications
- MRI/A: use increasing; no radiation; uses gadolinium for contrast; may be too slow in emergency cases; no metal
Spect Scanning

Thallium Stress Test Results

Stress Testing

- XST: used to detect ischemia, CAD, cardiac response to exercise; TM or bike
- Nuclear XST: use with LBBB, or w/ ? results from XST(aka thallium/mibi/cardiolyte)
- Pharmacologic/chemical: with adenosine, dipyridamole, dobutamine, Lexiscan
- Now, only contraindication (in stable patient) is symptomatic AS
Treadmill Exercise Stress Test

EP Studies - electrophysiologic

- Performed in cath lab
- Used to detect and treat certain rhythm disorders
- Certain identified arrhythmias (e.g., WPW, SVT, A-fib, VT) treated pharmacologically or with RFA (radio-frequency ablation, aka catheter ablation) or cryotherapy

Electrophysiologic Studies involve mapping the heart's electrical activity
Cardiac Catheterization (aka Coronary Angiography)

- Best used to evaluate and treat CAD
- Coronary angiography (visualize vessels)
- Angioplasty (PTCA aka "balloon")
- Angioplasty with stent placement (bare metal or drug-eluting stents)
PANCE/PANRE Review Course

Sources:

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• Scheidt, S., Basic Electrocardiography, Vol. 36, Summit, NJ; CIBA-GEIGY Corp., 1996
• www.commons.wikimedia.org
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So, on to Cardiology I . . . .
Thank You!