Cardiology Handouts

Infective Endocarditis

Any new onset murmur with fever is infective endocarditis until proven otherwise

Infective endocarditis is an infection of the endocardial surface of the heart. The intracardiac effects of this infection include severe valvular insufficiency, which may lead to intractable congestive heart failure and myocardial abscesses.

- **IVDA** involve the **tricuspid valve**
- **S aureus** (aka “Acute bacterial endocarditis”)
  - Overall most common cause is IVDA
  - Prosthetic valves

**Non IV drug abusers** the **mitral valve**

*Streptococcus viridans*

(aka “subacute bacterial endocarditis”)

- This organism accounts for approximately 50-60% of cases of subacute disease.
- Most clinical signs and symptoms are mediated immunologically
  - **Roth’s spots** are noted in the retina
  - **Janeway lesions** usually arise from infected microemboli
  - **Osler Nodes:** small tender subcutaneous nodules on digits

**DX:**
- **Echocardiography** has become the indirect diagnostic method of choice
- **Transesophageal echocardiography** was developed to overcome the problems in visualizing prosthetic valve thrombi and right-sided events.
- Procedure of choice if the suspicion is high

**TX: IV PCN and ceftriaxone**

- Adult antimicrobial IE preventive regimens for dental, oral, respiratory tract, infected soft tissue, or esophageal procedures recommended from oral-dental sources are as follows:
- Administer amoxicillin at 2 g orally 1 hour before the procedure and 1 gm 2 hours after the procedure others Ampicillin, cephalexin, clindamycin, ceftriaxone
- **Prophylactic PCN** with **oral surgeries and Invasive manipulation** of the respiratory tract for example tonsillectomies, rigid bronchoscopy. Gastrointestinal surgery, biliary tract surgery, sclerotherapy of esophageal varices, dilatation of esophageal strictures, and ECP
- **Established GU infection**
- Generally, hysterectomies, vaginal delivery, cesarean delivery, urethral catheterizations, dilation and curettage, therapeutic abortions, sterilization procedures, insertion or removal of intrauterine devices, cardiac catheterizations, angioplasties, or endoscopies with or without biopsies do not require prophylaxis.

**Rheumatic Heart Disease**
- Chronic rheumatic heart disease remains the **leading cause of mitral valve stenosis** and valve replacement in adults in the United States
- 1st Mitral valve, 2nd Aortic Valve, 3rd Tricuspid Valve
- Rheumatic fever develops in children and adolescents following pharyngitis with **group A beta-hemolytic Streptococcus**
- The presence of the **M protein** is the most important virulence factor for group A streptococcal infection in humans and **anti–M antibodies** against the streptococcal infection may cross react with **heart tissue**.

- The **Jones criteria** require the presence of 2 major or 1 major and 2 minor criteria for the diagnosis of rheumatic fever.
  - The **major diagnostic criteria**
  - carditis
  - polyarthritis
  - chorea, subcutaneous nodules, and erythema marginatum.
  - The **minor diagnostic criteria**
  - include fever, arthralgia,
  - prolonged PR interval on the electrocardiogram, **elevated ESR** presence of C-reactive protein, and leukocytosis.
  - **ASO Titer test**
  - Patients with rheumatic heart disease also may develop **atrial fibrillation**
Aortic Stenosis

- Males > females
- **Congenital bicuspid valve**, rheumatic fever
- **Degenerative calcific changes of the valve**
- Most common acquired valve stenosis
- Right 2\(^{nd}\) ICS radiates to carotids and down to border of apex
- SXS: **Syncope, dyspnea, angina on exertion**
- Gradual decrease in physical activity
- **Angina pectoris** (30-40%)
- **Incidence of nitroglycerin-induced syncope**
- Always consider AS as a possible etiology for a patient in the ED with particular hemodynamic sensitivity to nitrates.

  **Syncope during exertion:**
  - Systolic ejection murmur with radiation to the neck
  - Heard best 2\(^{nd}\) ICS right side
  - LVH after long standing disease and left ventricular lift

- CXR will show LVH and on EKG there is LVH
- Need Coumadin to prevent emboli

| Echocardiogram is the diagnostic test of choice |

Aortic Insufficiency (Regurgitation)

- Primary **causes are idiopathic** (80%) and hypertension, rheumatic fever, and **bacterial endocarditis**, SLE, RA, **Marfan’s**
- ??SSRIs??
- SXS: fatigue, weakness, exertional dyspnea, syncope, CP with exertion
- **Wide arterial pulse pressure** causing **“Water hammer pulse”**
- High pitched decrescendo diastolic murmur heard along the left sternal border 2\(^{nd}\) to 3\(^{rd}\) ICS
- **Diastolic blowing murmur**
- **Austin Flint murmur** is a mid-diastolic c/w aortic regurgitation
- Patient is seated and **leans forward with breath held in expiration**
- Remember blood flow is going back into the heart and left ventricle being removed from the peripheral arterial system

| Echocardiogram is the diagnostic test of choice |
Mitral Stenosis

- Most common valvular disorder caused by rheumatic fever
- SLE, RA
  - After the initial episode of RF, a latency period of 20-40 years occurs until the onset of symptoms
- Pathophysiology: type 5 streptococcal M protein, which cross-reacts with myocardial tissue. Pathologic examination of the mitral valve at this time reveals proliferation of fibroblasts and macrophages.
- Atrial fibrillation in 80% of these patients (new onset)
  - SXS: typical “diastolic opening snap” accentuated S1
  - Characteristic diastolic low-pitched, rumbling murmur sudden squatting all are useful in accentuating the murmur
- Orthopnea, DOE, PND EKG=LAH
- Systemic embolism
- Infective endocarditis
- Heard best at the apex

Echocardiogram is the diagnostic test of choice

Mitral Regurgitation (Insufficiency)

- Most common cause is mitral valve prolapse (MVP) has become responsible for 45% of cases of mitral regurgitation
- Causes: spontaneous chordae tendineae rupture secondary to myocardial infarction the left anterior descending artery being the cause of the acute MI=acute cardiogenic shock
  - spontaneous chordae tendineae or papillary muscle rupture secondary to myocardial infarction
- Acute mitral regurgitation
  - When associated with coronary artery disease and acute myocardial infarction typically, inferior myocardial infarction, which may lead to papillary muscle dysfunction
  - Rheumatic heart disease
  - The murmur often is harsh. It may be heard over the back of the neck, vertebra, and/or sacrum and may radiate to the axilla, back, and left sternal border.
  - Loud pansystolic murmur at the apex radiating to the axilla and base
  - SXS: fatigue, exertional dyspnea, orthopnea
  - S3 gallop secondary to LVH

Echocardiogram is the diagnostic test of choice
**Mitral Valve Prolapse**

- Clinical syndrome which is usually benign
- Females > males
- Age 14-30 and thin??Marfan?? Ehlers-Danlos syndrome, Graves disease
- **SXS:** palpitations lightheaded syncope
- **Mid or late systolic click** crescendo-decrescendo
- murmur heard best at the apex
- patients with **evidence of regurgitation by echo** should be given **antibiotic prophylaxis** during invasive procedures to help **prevent** **bacterial endocarditis**
- **Accentuated MVP means** = Earlier systolic click and Longer murmur
- **Accentuated by standing or Valsalva maneuver**
- Decreasing preload will causes more laxity on the chordae tendineae which allows the mitral valve to prolapse earlier in systole, leading to an earlier systolic click (i.e. closer to S1), and a longer murmur (more time for more blood to regurgitate).
- **Squatting** the more filled the ventricle...the more its wall is stretched...the more the pull/tightness on the chordae tendineae..hence, it will be more later during the systole so the **click will be heard later (nearer to S2)** and since the prolapse is occurring later, this allows little blood to regurgitate into the LA thereby **decreasing the murmur intensity**
- **The late systolic click and murmur then become accentuated in the**
  - Standing and Valsalva and hand grip
- Echocardiogram is the diagnostic test of choice
- Tx with **beta blocker** such as **Atenolol**

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**Tricuspid Regurgitation**

- **Caused by pulmonary HTN from COPD**
- **Ebstein anomaly** is the **most common congenital form**
- In young adults **Rheumatic disease** is the most common cause of pure tricuspid regurgitation due to deformation of the leaflets.
- In the adult **carcinoid, bacterial endocarditis**, and CHF, Marfan’s, RA
- Medication phentermine and fenfluramine (**phen-fen**) or dexfenfluramine
- **SXS** = **right sided heart failure**, ascites, leg edema, JVD
- A high-pitched pansystolic murmur (**4th ICS** in the parasternal region)
  - **Increase with inspiration** and **decrease with expiration**
  - **decrease intensity** in the **standing position** and Valsalva maneuver.
  - **DX:** Echocardiogram
Pulmonary Stenosis
Most common cause is congenital
Rheumatic heart disease, carcinoid
**SXS:** syncope, SOB, RVH leads to RAD

<table>
<thead>
<tr>
<th>S2 is widely split</th>
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<tr>
<td>Systolic ejection murmur left upper sternal border with radiation into back.</td>
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<tr>
<td>Increase with inspiration</td>
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<td>DX: Echocardiogram</td>
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Commotio cordis (which is Latin for "disturbance of the heart") is, in essence, a concussion of the heart. Initially described as early as 1857, it is defined as an instantaneous cardiac arrest produced by a witnessed, nonpenetrating blow to the chest, in the absence of preexisting heart disease or identifiable morphologic injury to the sternum, ribs, chest wall, or heart.

Remember it’s all about the **QT interval** prolonging it makes the “Vulnerable Window” open up and now bad and **lethal arrhythmias** can show up