Cardiothoracic Surgery

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Cardiothoracic Surgery

- Lung Disease
  - Solitary Pulmonary Nodule
  - Spontaneous Pneumothorax

- Acquired Heart Disease
  - Aortic Valve Disease
  - Mitral Valve Disease
  - Coronary Artery Disease
Pulmonary Disease

- **Solitary Pulmonary Nodule**
  - **Definition:**
    - Single spherical well-circumscribed opacity ≤ 3cm (but >10mm) surrounded by aerated lung. No associated atelectasis, hilar enlargement, or pleural effusion.
  - **Do these pts have symptoms?**
    - No
Solitary Pulmonary Nodule

- How are most detected?
  - Incidentally found on CXR or CT for some other reason
- Are they Cancer?
  - ?
- What could they be?
  - Benign
    - Nonspecific granulomas (25%), active granulomas (15%), Hamartomas (15%), Less common miscellaneous
Solitary Pulmonary Nodule

- Types of Malignancies in the lung?
  - NSCLCA vs Small Cell Lung Cancer
    - Why do we care?
    - NSCLCA(surgical)
      - Adenocarcinoma (47%), Squamous Cell Carcinoma (22%), Bronchioloalveolar Carcinoma (4%)
  - Small Cell Carcinoma (4%)
  - Solitary Metastasis (8%)
New SPN (6 mm to 30 mm) identified on CXR or CT scan

- Benign calcification present or 2-year stability demonstrated? (Yes) -> No further intervention required, except for patients with pure ground glass opacities, in whom longer annual follow-up should be considered
  - No -> Establish diagnosis by biopsy when possible. Consider XRT or monitor for symptoms and palliate as necessary.

- Surgical risk acceptable? (See Chapter 10) (No) -> No
  - Yes -> Assess clinical probability of cancer

  - Low probability of cancer (<5%) -> Serial high-resolution CT at 3, 6, 12, and 24 months
    - Negative tests

  - Intermediate probability of cancer (5% to 60%) -> Additional testing
    - PET imaging, if available
    - Contrast-enhanced CT, depending on institutional expertise
    - Transthoracic fine-needle aspiration biopsy, if nodule is peripherally located
    - Bronchoscopy, if air-bronchogram present or if operator has expertise with newer guided techniques
    - Positive tests

  - High probability of cancer (>60%) -> Video-assisted thoracoscopic surgery; examination of a frozen section, followed by resection if nodule is malignant
Surgical Management of Lung Cancer

- Operability vs Resectability

- Operability
  - What is the definition?
    - Will the patient tolerate the procedure from a medical standpoint

- Resectability
  - What is the definition?
    - Is the tumor removable with negative margins
Surgical Management of Lung Cancer

- **Operability**
  - How is this determined?
    - Cardiac clearance, Pulmonary function testing, nutritional status etc…

- **Resectability**
  - How is this determined?
    - H&P (including metastatic w/u), CAT scan of the chest including adrenals, PET/CT scan for staging
Case 1

- 55 y/o male with an abnormal “shadow” on routine CXR obtained during evaluation for a new job
  - What do you do next?
    - Obtain any prior CXR’s – he brings a report of a cxr from 1 year ago that was normal
  - H & P
    - What do you ask?
    - Smoker, Questions regarding metastatic disease
Case 1

What study would you get next?

CT or PET/CT Scan
Case 1

- 55 y/o male with PET pos LUL lung nodule, new lesion, smoker.
  - What is chance of cancer – low, med, high?
    - High

- What would you do next?
  - Repeat PET/CT in 3 months vs Biopsy vs Thoracoscopic Wedge Resection?
Case 1

- What is the last criteria left to fulfill?
  - Operability and Resectability

- Operability
  - No Cardiac issues, PFT’s – FeV1 2500ml, 75% Predicted; DLCO 85% Predicted, Good nutritional status

- Resectability
  - No PET active mediastinal LN’s, all disease is resectable, No distant metastasis
Pneumothorax

Definition?
Air or gas inside the chest cavity but outside the lung
Pneumothorax

- Primary Spontaneous
  - No clinically apparent lung disorder

- Secondary Spontaneous
  - Underlying pulmonary disease (usually COPD)
Pneumothorax

- What is a large ptx?
  - ≥ 3 cm cupola-to-apex of chest on cxr or ~20%

- what is the typical treatment?
  - Chest tube
Case 2

- 22 y/o tall thin male, smoker, out riding his bike developed sudden chest pain and SOB – presents to ER
  - How would you start w/u?
    - H & P
      - stability
      - Trauma, drug use, happen before
      - ECG tracing, VSS, Pulse Oximetry, Alert
  - What study would you get?
    - CXR – shows 20% left side ptx 3cm cupola-to-apex
Case 2

- 22 y/o tall thin male, smoker, Asymptomatic 20% ptx 3cm cupola-to-apex
- Management options?
  - Keep in ER 3 to 6 hrs, repeat film, no progression can d/c to home
  - Admit for observation and serial cxr’s
  - Place small Chest tube
Case 3

- 22 y/o tall thin male, smoker, out riding his bike developed sudden chest pain and SOB – presents to ER. While you are evaluating the pt in the ER you note he is becoming lethargic, RR 35, BP 80/60, HR 128, PO 97%
  - What do you do next?
    - Listen for breath sounds
Case 3

- UNSTABLE 22 y/o male now in pulseless electrical activity (PEA) after c/o chest pain and SOB while riding his bike – NO breath sounds Left Chest

What is his dx?

Tension ptx – what does that mean?

Build up of pressure in the chest, shift of mediastinum, loss of venous return to the heart causing PEA
Case 3

What’s the management of a Tension ptx?

- Needle Decompression
  - What is the Anatomical Area?
    - Second ICS, Mid Clavicular line – Why?
      - Avoid IMA, Lung, and other vital structures
Case 3

- How fast after needle decompression should vital signs return?
  - Immediately

- Last step after needle decompression?
  - Placement of Chest Tube
Final Management of Spontaneous Pneumothorax

- What is the chance of recurrence?
  - 30-40%

- When should a definitive Pleurodesis be performed?
  - After first recurrence (second ptx)
  - What method of Pleurodesis – Chemical or Surgical (thoracoscopic (VATs) mechanical pleurodesis)?
    - Surgical VATs mechanical pleurodesis
Cardiac Disease

- Coronary Artery Disease
- Aortic Stenosis
- Aortic Regurgitation (insufficiency)
- Mitral Stenosis
- Mitral Regurgitation (insufficiency)
Coronary Artery Disease (CAD)

- Not enough blood flow to the myocardium to meet the oxygen demands causing ischemia
Coronary Artery Disease (CAD)

- What happens if blood flow is not reestablished?
  - Death of myocardium and eventually the patient.
- How can blood flow be reestablished?
  - Coronary angioplasty and stents
  - Coronary Bypass Grafting
Coronary Artery Disease (CAD)

- 72 y/o male admitted with h/o CAD with increasing chest pain ECG changes
- Definitive diagnostic study?
  - Cardiac Catheterization - found to have 3 vessel CAD and decrease heart function
  - What is best management regarding CABG vs Coronary Artery Stenting?
    - CABG
Valvular Heart Disease
Auscultation of the Heart

- **Aortic Area**
- **Pulmonic Area**
- **Sternum**
- **Tricuspid Area**
- **Mitral Area**
- **Mid Clavicular Line**
- **Anterior Axillary Line**
Normal Blood Flow Through the Heart
Aortic Stenosis

What’s the physiologic problem and it’s consequences?
- Outflow problem causing a pressure overload to the left ventricle
- Consequence?
  - Hypertrophied thickened left ventricle
    - So what?
      - Eventually can’t get enough blood/oxygen to the thickened muscle and pressure will back up into the pulmonary system
Aortic Stenosis

- Symptoms?
  - Syncope, Angina, Congestive Heart Failure
- PE?
  - Harsh midsystolic murmur at right second ICS
- Best Study?
  - Echocardiogram – what does it show?
  - Aortic Valve Area and Gradient
Aortic Stenosis
Aortic Insufficiency

What’s the physiologic problem and it’s consequences?

- Volume and Pressure overload to the left ventricle

Consequence?

- Ventricular dilatation, volume overload of the pulmonary system
Aortic Insufficiency

- Symptoms?
  - SOB, fatigue, decreasing exercise tolerance

- PE?
  - Blowing, high-pitched, diastolic murmur at 3rd ICS along lower left sternal border

- Best Study?
  - Echocardiography – what does it show?
    - Large dilated LV with decreased LVF and 1-4+ insufficiency
Aortic Insufficiency
Mitral Stenosis

What’s the physiologic problem and it’s consequences?

- Outflow problem causing a pressure overload to the left atrium
- Consequence?
  - Dilatation of the left atrium and pressure build up in the pulmonary system
Mitral Stenosis

- **Symptoms?**
  - Dyspnea on exertion, Paroxysmal nocturnal dyspnea, orthopnea, *hemoptysis*

- **PE?**
  - Low-pitched *rumbling* diastolic apical murmur

- **Best Study?**
  - Echocardiography – what does it show?
    - Atrial Fibrillation, Dilated Left Atrium, Preserved LVF
Mitral Stenosis
Mitral Insufficiency

- What’s the physiologic problem and it’s consequences?
  - Volume and Pressure overload to the left atrium
  - Consequence?
    - Left atrial distension and volume and pressure overload in the pulmonary system
Mitral Insufficiency

- **Symptoms?**
  - Dyspnea on exertion, orthopnea, SOB

- **PE?**
  - Apical, high-pitched, holosystolic murmur that radiates to the axilla and back

- **Best Study?**
  - Echocardiography – what does it show?
    - Grade of 1-4+MR, falsely elevated or normal LV fxn
Mitral Insufficiency
35 y/o Female with dyspnea on exertion, orthopnea, paroxysmal nocturnal dyspnea, cough and **Hemoptysis**. She had Rheumatic fever at 15 yrs old. On PE she has a **Low-pitched rumbling** diastolic apical murmur.

What is her diagnosis?
- Mitral Stenosis
72 y/o male with h/o angina and exertional syncope episodes. On PE he has Harsh midsystolic murmur at right second ICS.

What is his diagnosis?

- Aortic Stenosis
26 y/o male **drug abuser** admitted with fevers and sudden onset congestive heart failure. On PE he has a new loud diastolic murmur at the 3rd ICS along lower left sternal border.

What is his diagnosis?

- Acute aortic insufficiency with infective endocarditis
72 y/o female with SOB and known wide pulse pressure for years. On PE he has a Blowing, high-pitched, diastolic murmur at 3rd ICS along lower left sternal border

What is his diagnosis?
- Chronic aortic valve insufficiency
55 y/o female with h/o mitral valve prolapse now with dyspnea on exertion, orthopnea, and atrial fibrillation. On PE she has a **Apical, high-pitched, holosystolic murmur** that radiates to the axilla and back.

What is her diagnosis?
- Mitral Insufficiency
Questions