CLINICAL CLERKS
GRAND ROUNDS
“Confusion in the Air”

Group V
ORIGENES-SO
The patient is P.D,

- 77 y/o
- Male
- Filipino
- Roman Catholic
- Sta. Ana, Manila
- 1st admission in UERM Memorial Hospital
- Date of Admission: June 17, 2011
CHIEF COMPLAINT

DIFFICULTY OF BREATHING
6 days duration
TEMPORAL PROFILE

6 days PTA
5 days PTA
4 days PTA
3 days PTA
2 days PTA
1 day PTA

DOB; Productive Cough
Ventolin Neb
Cyanosis

Legend
PERTINENT NEGATIVES

- Fever
- Chest pain
- Clubbing
- Edema
- Orthopnea
PAST MEDICAL HISTORY

• Pneumonia last June 2010, treated

• PTB diagnosed last March 2011 at a health center, on anti-Koch’s medication for 4 months, unrecalled dosage and drug component, good compliance

• Hypertension diagnosed last 2009, maintained on Felodipine 10mg OD (highest BP at 160/100) with poor compliance, with no regular check-ups. Last check-up was unrecalled

• MVA 20 years ago, no chest and lung injury

No history of any surgery
FAMILY & SOCIAL HISTORY

- Hypertension - sibling
- No family history of Asthma, Cancer and Diabetes.
- Smoker with 30 pack years, occasional alcoholic beverage drinker
• (+) loss of appetite associated with undocumented weight loss
• (+) wears glasses, unrecalled grade
• (-) paroxysmal nocturnal dyspnea
• (-) easy fatigability
## PHYSICAL EXAM

<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>General Survey</strong></td>
<td>Ectomorph, acutely ill, speaks in sentences, not in cardiorespiratory distress</td>
</tr>
<tr>
<td><strong>Vital Signs</strong></td>
<td>160/90&gt;90&gt;18&gt;36.9</td>
</tr>
<tr>
<td><strong>HEENT</strong></td>
<td>Anicteric sclerae, pink palpebral conjunctivae, no tonsillopharyngeal congestion, no cervical lymphadenopathies, prominent neck veins</td>
</tr>
<tr>
<td><strong>Chest and Lungs</strong></td>
<td>Chest lag left, decreased tactile fremitus on the left lung field, hyperresonance on the left lung field, decreased breath sounds on the left lung field, no wheezes, no crackles</td>
</tr>
<tr>
<td><strong>Heart</strong></td>
<td>Adynamic precordium, normal rate and regular rhythm, distinct S1 and S2, PMI at 5th ICS LMCL, no murmurs</td>
</tr>
<tr>
<td><strong>Abdomen</strong></td>
<td>Flat, normoactive bowel sounds, soft abdomen, tympanitic, non-tender, no masses</td>
</tr>
<tr>
<td><strong>Extremities</strong></td>
<td>Full and equal pulses, no edema, no cyanosis, no clubbing</td>
</tr>
</tbody>
</table>
• 77 year old male
• Smoker, 30 pack years
• Hypertensive
• History of PTB and Pneumonia
• Difficulty of breathing of 6 days
• Dyspnea on exertion
• Productive cough with whitish, purulent discharge
• Perioral cyanosis
SALIENT FEATURES

• BP = 160/90

• Chest lag left, decreased tactile fremitus on the left lung field, hyperresonance on the left lung field, decreased breath sounds on the left lung field
Differential Diagnoses

1. Pleural Effusion
2. COPD in acute exacerbation
3. Pneumonia
4. Congestive Heart Failure
### Differential Diagnosis
#### Pleural effusion

<table>
<thead>
<tr>
<th>Rule In</th>
<th>Rule Out</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Diagnosed case of COPD and PTB</td>
<td>• Absence of chest pain</td>
</tr>
<tr>
<td>• Presence of intermittent dyspnea described as inability to get enough air</td>
<td>• Patient was not tachypneic</td>
</tr>
<tr>
<td>• Decreased breath sounds on auscultation</td>
<td>• No orthopnea</td>
</tr>
<tr>
<td></td>
<td>• No increased resonance of voice sounds</td>
</tr>
<tr>
<td></td>
<td>• No history of surgery, trauma, or immobility</td>
</tr>
<tr>
<td>Rule In</td>
<td>Rule Out</td>
</tr>
<tr>
<td>---------</td>
<td>----------</td>
</tr>
</tbody>
</table>
| • Age of patient (77 years old)  
• History of PTB and Pneumonia  
• Perioral Cyanosis  
• Productive cough  
• Dyspnea especially on exertion  
• 30 pack years smoking | • No fatigue and weakness  
• No wheezing  
• No chest tightness  
• No use of accessory muscles  
• No tachypnea  
• No fever  
• No Malaise  
• No change in sputum color or amount  
• No signs of fluid retention |
## Differential Diagnosis
**Pneumonia**

<table>
<thead>
<tr>
<th>Rule In</th>
<th>Rule Out</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Increase risk due to patient’s age, history of smoking and COPD</td>
<td>• Patient was afebrile</td>
</tr>
<tr>
<td>• Productive cough with whitish mucoid sputum.</td>
<td>• No tachycardia and tachypnea, no use of accessory muscles of respiration.</td>
</tr>
<tr>
<td>• Decrease tactile fremitus on left lung field.</td>
<td>• No crackles on auscultation</td>
</tr>
<tr>
<td>• Decrease breath sound</td>
<td></td>
</tr>
</tbody>
</table>
# Differential Diagnosis
## Congestive Heart Failure

<table>
<thead>
<tr>
<th>Rule In</th>
<th>Rule Out</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Age of patient (77 years old)</td>
<td>• No fatigue</td>
</tr>
<tr>
<td>• Higher in men</td>
<td>• No orthopnea</td>
</tr>
<tr>
<td>• Presence of Hypertension</td>
<td>• No paroxysmal nocturnal dyspnea</td>
</tr>
<tr>
<td>• Presence of Dyspnea on exertion</td>
<td>• No Cheyne-Stokes Respiration</td>
</tr>
<tr>
<td>• With Weight loss</td>
<td>• No anorexia, nausea, and early satiety associated with abdominal pain</td>
</tr>
<tr>
<td>• Central cyanosis</td>
<td>and fullness</td>
</tr>
<tr>
<td></td>
<td>• No right-upper quadrant pain</td>
</tr>
<tr>
<td></td>
<td>• No rales</td>
</tr>
<tr>
<td></td>
<td>• PMI of patient at 5th ICS LMCL</td>
</tr>
<tr>
<td></td>
<td>• No S3, no murmurs of mitral and tricuspid regurgitation</td>
</tr>
<tr>
<td></td>
<td>• No hepatomegaly, ascites, jaundice, peripheral edema</td>
</tr>
</tbody>
</table>
APPROACH TO DYSPNEA

History

Physical Examination

**General Appearance:** Speak in full sentences? Accessory muscles? Color?

**Vital Signs:** Tachypnea? Pulsus Paradoxis? Oximetry-evidence of desaturation?

**Cardiac exam:** JVP elevated? Precordial impulse? Gallop? Murmur?

**Extremities:** Edema? Cyanosis?
At this point, diagnosis may be evident– if not, proceed to further evaluation

Chest radiograph
Assess cardiac size, evidence of CHF
Assess for hyperinflation
Assess for pneumonia, interstitial lung disease, pleural effusions

Suspect low cardiac output, myocardial ischemia, or pulmonary vascular disease

Suspect respiratory pump or gas exchange abnormality

Suspect high cardiac output
CHEST X-RAY
Fibrotic opacities in both upper lungs

03.22.2011

06.18.2011
Pneumohydrothorax, Left
ECG and echocardiogram assess left ventricular function and pulmonary artery pressure

Pulmonary function testing - if diffusing capacity reduced, consider CT angiogram to assess for interstitial lung disease and pulmonary embolism

Hematocrit, thyroid function tests

If diagnosis still uncertain, obtain cardiopulmonary exercise test
ECG

- Sinus Rhythm
- Heart Rate: 95-100 bpm
- 90° axis
- Right Atrial Enlargement
- Poor R wave progression
- Non-specific T wave changes
- No hypertrophy, infarct, injury
<table>
<thead>
<tr>
<th>ABG</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>pH</td>
<td>7.44</td>
<td>Total CO₂</td>
<td>36.10</td>
<td></td>
</tr>
<tr>
<td>pCO₂</td>
<td>50</td>
<td>FIO₂</td>
<td>2 LPM</td>
<td></td>
</tr>
<tr>
<td>pO₂</td>
<td>90</td>
<td>Temp</td>
<td>36</td>
<td></td>
</tr>
<tr>
<td>HCO₃</td>
<td>34.5</td>
<td>RR</td>
<td>21</td>
<td></td>
</tr>
<tr>
<td>BE</td>
<td>10.2</td>
<td>Po₂</td>
<td>47</td>
<td></td>
</tr>
<tr>
<td>O₂ sat</td>
<td>98</td>
<td>PO₂</td>
<td>0.5</td>
<td></td>
</tr>
</tbody>
</table>
Arterial plasma [HCO₃⁻] (mmol/L) vs. Arterial blood [H⁺] (nmol/L) diagram showing different acid-base disorders:

- **Chronic respiratory acidosis**
- **Metabolic alkalosis**
- **Acute respiratory acidosis**
- **Metabolic acidosis**
- **Chronic respiratory alkalosis**
- **Acute respiratory alkalosis**

The graph highlights the normal range and various disorders based on the pH and bicarbonate levels. The point labeled as normal is located within the normal range on the graph.


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## CBC

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hgb</td>
<td>144</td>
</tr>
<tr>
<td>Hct</td>
<td>42</td>
</tr>
<tr>
<td>RBC</td>
<td>4.8</td>
</tr>
<tr>
<td>WBC</td>
<td>9.6</td>
</tr>
<tr>
<td>Neutrophils</td>
<td>80</td>
</tr>
<tr>
<td>Lymphocytes</td>
<td>20</td>
</tr>
<tr>
<td>Platelets</td>
<td>302</td>
</tr>
<tr>
<td>RBC Morphology</td>
<td>Normochromic, Normocytic</td>
</tr>
</tbody>
</table>

## ELECTROLYTES

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sodium</td>
<td>140</td>
</tr>
<tr>
<td>Potassium</td>
<td>3.8</td>
</tr>
</tbody>
</table>
### BLOOD CHEMISTRY

<table>
<thead>
<tr>
<th></th>
<th>06.18.2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>Creatinine</td>
<td>81</td>
</tr>
</tbody>
</table>

### OTHERS

<table>
<thead>
<tr>
<th></th>
<th>06.18.2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bleeding Time</td>
<td>2’30”</td>
</tr>
<tr>
<td>Clotting Time</td>
<td>12’30”</td>
</tr>
</tbody>
</table>
## CHEST TUBE DRAIN CS (06.24.2011)

<table>
<thead>
<tr>
<th>Specimen</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visual Appearance</td>
<td>Mucosalivary</td>
<td>Salivary</td>
<td>Salivary</td>
</tr>
<tr>
<td>Reading</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Lab Diagnosis</td>
<td><strong>Negative</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Heavy growth of *Acinetobacter* spp.
SECONDARY SPONTANEOUS PNEUMOTHORAX secondary to COPD
<table>
<thead>
<tr>
<th>PRIMARY (PSP)</th>
<th>SECONDARY (SSP)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(-) Underlying pulmonary pathology</td>
<td>✓ (+) Underlying pulmonary pathology</td>
</tr>
<tr>
<td>6x more common in Men</td>
<td>✓ (COPD: most common cause)</td>
</tr>
<tr>
<td>Age: 30-40’s</td>
<td>✓ 3x more common in Men</td>
</tr>
<tr>
<td>History of Smoking</td>
<td>✓ Age: 60’s</td>
</tr>
<tr>
<td></td>
<td>✓ History of Smoking</td>
</tr>
</tbody>
</table>
Underlying Lung Disease

Other Risk Factors: Smoking, Age, Toxins, etc.

↑ Vulnerability of Lung Tissues

Rupture or Collapse of Lung Tissues

Air leaks into the pleural space

PNEUMOTHORAX

Manifestations
Pleuritic Chest Pain
Tachycardia
Hypoxia (Cyanosis)
Malaise

Sudden onset of intense dyspnea
Tachypnea
Shortness of breath
PHYSICAL EXAMINATION

- Decreased breath sound
- Decreased tactile fremitus
- Hyperresonance of affected lung field
- Tachypnea
- Asymmetrical chest expansion
FINAL DIAGNOSIS

SECONDARY SPONTANEOUS PNEUMOTHORAX
secondary to COPD and PTB

Hypertension Stage I, uncontrolled
Oxygen Supplement: this has been shown to speed resolution of the pneumothorax

Chest Tube Thoracostomy: the most definitive initial treatment of a pneumothorax
- procedure of choice
- inserted at the “safe zone”

Needle Aspiration

Pleurodesis
Interpleural distance = \( \frac{A+B+C}{3} \)

Using the formula in calculating for the interpleural distance:

\[
\frac{(A+B+C)}{3} = \text{Interpleural Distance}
\]

A = 55 mm  
B = 35 mm  
C = 30 mm

\[
\frac{(55+35+30)}{3} = 40 \text{ mm}
\]
Estimating the size of a Pneumothorax

<table>
<thead>
<tr>
<th>AVERAGE INTERPLEURAL DISTANCE (mm)</th>
<th>Percent Pneumothorax</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Upright film</td>
</tr>
<tr>
<td>10</td>
<td>14%</td>
</tr>
<tr>
<td>20</td>
<td>23%</td>
</tr>
<tr>
<td>30</td>
<td>32%</td>
</tr>
<tr>
<td>40</td>
<td>40%</td>
</tr>
<tr>
<td>50</td>
<td>49%</td>
</tr>
</tbody>
</table>

Management of Spontaneous Secondary Pneumothorax

American College of Chest Physicians Guidelines

• Recommends chest tube insertion for all patients and pleurodesis with the first episode of a secondary spontaneous pneumothorax to prevent a recurrence.
• Medical thoracoscopy or video-assisted thoracoscopic surgery (VATS) as the primary procedure, and a limited axillary thoracotomy with pleural abrasion as a secondary approach to prevent recurrence.
Management of Spontaneous Secondary Pneumothorax

British Thoracic Society Guidelines 2003

- Simple aspiration is less likely to succeed in secondary pneumothoraces and is only recommended as an initial treatment in small (<2cm) pneumothoraces in minimally breathless patients under the age of 50 years.
If simple aspiration or catheter aspiration drainage of any pneumothorax is unsuccessful in controlling symptoms, then an intercostal tube should be inserted.
• Intercostal tube drainage is recommended in secondary pneumothorax except in patients who are not breathless and have a very small (<1 cm or apical) pneumothorax.
• Chemical pleurodesis can control difficult or recurrent pneumothorax but should only be attempted if the patient is either unwilling or unable to undergo surgery.
• O2 supplementation via nasal cannula at 2Lpm
• Closed tube thoracostomy
• Tramadol for pain management
S/P CTT insertion, Left

Sentinel hole at the 4th ICS
Management Problem: COPD

- None of the existing medications for COPD have been shown to modify the long-term decline in lung function that is the hallmark of this disease.
- Pharmacotherapy for COPD is used to decrease symptoms and/or exacerbations.
- Bronchodilator medications are central to the symptomatic management of COPD.
Management of COPD

The patient was treated based on Stage IV: Very Severe COPD where the symptoms of cough and sputum production continue, dyspnea worsens and additional symptoms heralding complications.

Medications:
Salbutamol Nebulization Q4 (short acting bronchodilator)
Medrol BID (glucocorticosteriod)
Symbicort (formoterol and budesonide)
O2 supplementation
Management Problem: Hypertension

Lifestyle Modification

Not at Goal Blood Pressure (<140/90 mmHg)
(<130/80 mmHg for patients with diabetes or chronic kidney disease)

Initial Drug Choices

Without Compelling Indications

Stage 1 Hypertension (SBP 140-159 or DBP 90-99 mmHg)
Thiazide-type diuretics for most. May consider ACEI, ARB, BB, CCB, or combination.

Stage 2 Hypertension (SBP >160 or DBP >100 mmHg)
2-drug combination for most (usually thiazide type diuretic and ACEI, or ARB, or BB, or CCB).

With Compelling Indications

Drug(s) for the compelling indications
Other antihypertensive drugs (diuretics, ACEI, ARB, BB, CCB) as needed.

Not at Goal Blood Pressure

Optimize dosage or add additional drugs until goal blood pressure is achieved. Consider consultation with hypertension specialist.

JNC 7: Algorithm for treatment of hypertension
Management of Hypertension

- From the algorithm we can deduce that the patient falls under stage 1 hypertension with usual BP of 130 and highest at 160, the patient is already on calcium channel blocker felodipine so the patient was managed by optimizing the dosage of felodipine.

- Bouts of hypertension was noted in the wards thus combination drugs were sometimes added as needed, these drugs included Losartan a ACE inhibitor and Amlodipine a long-acting calcium channel blocker.
Management Problem: PTB

• New patients with pulmonary TB should receive a regimen containing 6 months of rifampicin: 2HRZE/4HR (Strong/High grade of evidence)

• The 2HRZE/6HE treatment regimen should be phased out (Strong/High grade of evidence)
• Wherever feasible, the optimal dosing frequency for new patients with pulmonary TB is daily throughout the course of therapy (Strong/High grade of evidence)

• New patients with pulmonary TB may receive a daily intensive phase followed by three times weekly continuation phase [2HRZE/4(HR)3] provided that each dose is directly observed (Conditional/High or moderate grade of evidence)
Management of PTB

The patient was treated according to Recommendation 1.1 which states that, New patients with pulmonary TB should receive a regimen containing 6 months’ rifampicin: 2HRZE/4HR.

The patient was able to complete the intensive phase of treatment which requires 2 months on HRZE and is on his continuing treatment for tuberculosis which is 4 months on HR (2/4months at time of admission).

Medications:
Rimactazid 450/400
COURSE IN THE WARDS
Pneumothorax

Left apical area

06.27.2011 (11th hospital day)
Loculated Pneumothorax

07.05.2011
(18th hospital day)
Prognosis

- 79% with secondary pneumothoraces and persistent air leaks: resolved air leaks by 14 days
- 5-year recurrence rate of 43% for secondary spontaneous pneumothorax
- Relationship of developing pneumothorax and smoking
- In COPD, survival rate is made using the BODE index
Follow-up on 7.12.11

<table>
<thead>
<tr>
<th>↓ Breath sounds on left upper lung field</th>
</tr>
</thead>
<tbody>
<tr>
<td>↑Tactile fremitus on left upper to mid left lung fields</td>
</tr>
<tr>
<td>Equal tactile fremitus in both basal lung fields</td>
</tr>
<tr>
<td>Hyperresonant on left lower lung fields, resonant in both upper upper lung fields</td>
</tr>
</tbody>
</table>
Symbicort 160/4.5 2 puffs 2x a day

Felodipine 10mg/tab

Rimactazid 100/450

Losartan 100mg/tab