Awesome Pulmonary Cases

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November 6, 2015
Pulmonary/Sleep/Critical Care
Case #1

History: 43 year old male with no past medical history presents with 2 days of progressive dyspnea and chest tightness. He was moving a piece of furniture up the stairs and noted severe shortness of breath and had to rest half way up the stairs. He denied any leg pain, swelling or discomfort. His symptoms of dyspnea persisted and at the advice of his wife he went to UC for evaluation. He denied fevers, chills or cough but was feeling quite tired. He denied joint pains or skin rash. He typically runs 3 miles 3-4 x per week and lifts weights at the gym. He had traveled by car 2 weeks earlier from Florida. He had no family history of blood clots, early heart disease or sudden death.
Case #1

- **PMHx:**
  - Migraines
  - Chews tobacco

- **PSHx**
  - Inguinal hernia repair

- **Medications:** none

- **Allergies:** NKDA

- **Family Hx**
  - Father: healthy
  - Mother: arthritis
Case #1

EXAM

- Vitals: HR 130, RR 17, BP: 134/87, Sats 94%, afebrile
- HEENT: benign
- CV: tachycardia with right sided third heart sound
- Lungs: CTA, normal respiratory effort, normal chest excursions
- Abdomen: soft, NT, ND, no organomegaly
- Extremities: no swelling, no edema
Case #1

- Assessment: 43 year old male previously healthy with acute onset dyspnea, tachycardia, mild hypoxia and abnormal cardiac exam.
Case #1
Differential Diagnosis

- Pulmonary
  - PE
  - Spontaneous pneumothorax
  - Pneumonia
  - ILD
- Cardiac
  - Acute MI
  - Cardiomyopathy
  - SVT or other arrhythmia
  - Tamponade
- GI
  - Ulcer with chronic blood loss
- Hematological
  - Acute anemia
Case #1
Laboratory Data

- WBC 6.7K
- Hgb 16
- BNP 100,
- d-dimer 4.6
- troponin 0.22
- ECG: tachycardia, no ST elevation, non specific ST wave changes
Case #1
Imaging Studies

- CTA: clot in main pulmonary artery extending into both upper lobe pulmonary arteries and RML and lower lobes, no infiltrates, no adenopathy
- Doppler ultrasound LE: small clot left popliteal vein
- Do I need an echocardiogram?
Case #1
Echocardiogram

- Echo cardiogram: mild to moderate RV dilation with decreased RV function, PAP 51mmHg above RAP pressure, LV function normal, clot in PA extending into right PA

- What do you do next????
Case #1
Treatment Options

- Anticoagulate
  - Heparin
  - LMWH
  - Thrombolysis
- IVC Filter
- Anticoagulate and IVC filter
- Surgical thrombolectomy
- IR catheter
## Massive Pulmonary Embolism (n=1001)

<table>
<thead>
<tr>
<th>Hemodynamics</th>
<th>Mortality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stable, RV dilatation</td>
<td>7%</td>
</tr>
<tr>
<td>Hypotension</td>
<td>14%</td>
</tr>
<tr>
<td>Hypotension + pressors</td>
<td>23%</td>
</tr>
<tr>
<td>Hypotension + CPR</td>
<td>60%</td>
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</tbody>
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*JACC 1997;30:1165*
Pulmonary Embolism

- Massive PE associated with hypotension, shock and generally large clot burden.
  - Current indication for thrombolytics
  - Hemodynamically unstable PE associated with increased risk of death within first 2 hours of presentation up to 72 hours
- Submassive: no hypotension but consider thrombolytics
  - High clot burden high
  - RV with evidence of strain pattern on ECG.
  - Persistent hypoxia
  - Free floating clot in atrium
  - PFO
Contraindications to Thrombolytics

- Hemorrhagic or recent stroke (3-6 mo.)
- Surgery/invasive procedure (<7-14 days)
- Recent GI hemorrhage (2-6 months)
- Severe hypertension
- CNS surgery (3-6 months)
- Retinopathy
- Pregnancy/Delivery
- Bleeding diathesis
- CPR
Thrombolysis vs Heparin in Acute PE

- Circulation 2004: meta-analysis of all randomized trials comparing thrombolytic therapy with heparin in patients with acute pulmonary embolism.
  - 11 trials, 748 patients, thrombolytic therapy was associated with a nonsignificant reduction in recurrent pulmonary embolism or death.
  - Thrombolytic therapy associated with a significant reduction in recurrent pulmonary embolism or death in trials with hemodynamically unstable pulmonary embolism 9.4% versus 19.0%.
  - Non major bleeding 22% vs 10%.
Pulmonary Embolism: Evidence for use of Thrombolytics in Submassive PE

- NEJM 2014: randomized controlled trial of tenecteplase plus heparin vs heparin alone. 1005 normotensive patients with intermediate risk PE with evidence of RV strain and increased troponin.
- Hemodynamic decompensation occurred in 2.6% tenecteplase group vs 5.6% in the placebo group P=0.02
- No difference in rate of death at 7 days
- Stroke occurred in 2.4% of tenecteplase group and 0.2%
Case #1

- Alteplase 100mg IV over 2 hours
- Patient complained of headache
  - Neuro exam fine, given Tylenol
- Patient complained of chest heaviness
- Patient anxious, doctor anxious

- Clinical exam 2 hours later
  - Headache improved with acetaminophen
  - HR 80, resolution of extra heart sound
Case #1, Following Day

- Subjective: patient feeling much better, no dyspnea or chest discomfort

- Clinical exam
  - HR 60, BP 111/58, RR 12, sats 96%
  - CV: RRR, nl S1S2
  - Lungs CTA

- Echo 24 hours later: mild RV dilation, PAP 22 mmHg above RAP, clot in PA almost completely resolved

- Assessment and Plan
  - 43 yr old male, submassive PE with mild hemodynamic compromise clinically much improved after thrombolytics.
    - Start rivaroxaban with recommended life long anticoagulation for unprovoked clot
    - Discharge with follow up 3 months CTA and echo
HPI: 57 year old Caucasian male presents for hematology consult. He had been seen in primary care for routine follow up DM and HTN. At that visit his blood sugars were under fairly good control but he was noted to have polycythemia. Blood work had demonstrated a hemoglobin of 20. One year prior his hemoglobin had been 15. His energy level was low and his breathing was fair. He had chronic lower extremity edema. He denied fevers, chills or chest pains. His weight was up 40 lbs since he quit smoking 1.5 years prior. The patient had smoked 1.5 ppd for 30 years. He did not have a known history of copd. He was unemployed but had worked construction for many years. His wife noted he snored loudly and his sleep was restless. He took a nap every day. He drank 4 cups of coffee per day and at least 2 alcoholic drinks per day.
Case #2

- PMHx
  - HTN
  - Diabetes type II
  - Psoriasis
  - Seizure disorder
  - Hyperlipidemia
  - Alcohol abuse

- PSHx
  - Appendectomy
  - Tonsillectomy
  - Hydrocele left side
Case #2

- **Family Hx**
  - Mother: HTN, DM
  - Father: atrial fibrillation

- **Medications**
  - Metformin 1000mg 2xdays
  - Losartan 50mg day
  - ASA 81mg day
  - Atenolol 100mg day
  - Dilantin 300mg day
  - Simvastatin 40mg day
Case #2

- Exam
  - Vitals: HR 85, RR 18, sats 83% RA, BP 140/90, afebrile, BMI 43
  - HEENT: ruddy appearing, narrowed posterior pharyngeal inlet, large tongue
  - CV: RRR nlS1S2
  - Lungs: CTA
  - Abdomen: obese, NT, ND, no organomegaly
  - Extremities: brawny edema bilaterally
Case #2

- Assessment: Morbidly obese unemployed 57 year old man with new onset polycythemia.
Differential Diagnosis: Polycythemia

- Primary
  - Polycythemia Vera

- Secondary
  - Pulmonary:
    - Parenchymal: severe ILD or emphysema
    - Vascular: pulmonary HTN, PE, OSA, AVM
  - Toxin: chronic carbon monoxide poisoning
  - Cardiac: intra cardiac shunt: VSD or ASD
  - Renal Cell carcinoma
  - Blood doping
Work up

- Repeat test
- Cbc : hgb >18.5 men and >16.5 women
- CXR
- Urine analysis
- Carboxyhemoglobin >5%
- Epo level
- Consider CT chest and echocardiogram
Case #2

- **Labs**
  - WBC 8.4K. Platelets 230K, Hgb 20
  - U/A negative
  - Epo level 67 (4-27 mU/mL normal)
  - Carbon monoxide level 2.5 (0-5% normal)
  - ABG: 7.4/54/56/33
Case #2

- CT: mild to moderate emphysema, no mediastinal adenopathy, no parenchymal infiltrates

- Transesophageal echo: normal LVF, RV normal, no evidence of shunt, no TR jet unable to calculate pulmonary artery pressure.

- PFT: moderate obstructive disease, dlco 58%, FVC 75%, FEV1 60%, FEV1/FVC 70

- Sleep study
Case #2: Sleep Study

- AHI 47, RDI 62, low desaturations 76%, TCCO2 baseline 62, max 80
- Bipap titration 15/6 cm with 3 L/min oxygen
- Diagnosis
  - Severe OSA with obesity hypoventilation
Case #2 Management

- Patient started on Bilevel with 3L/min oxygen
- Follow up hgb 17 after 6 weeks of bilevel
- Follow up hgb 13 after 3 months of bilevel
Case #2 Summary

- Profound weight gain due to smoking cessation: BMI increased from 32 to 43
- The distribution of weight gain likely contributed to severity of symptoms.
- Repeated obstructive events during sleep lead to repeated hypoxic events
- Suspect component of significant shunt physiology during sleep due to atelectasis at lung bases resulted in marked repeated hypoxic events
- Underlying emphysema also contributed to hypoxia
- Secondary polycythemia due to severe hypoxia
References

- Management Strategy and prognosis of Pulmonary Embolism Registry. JACC 1997;30:1165