Dyspnea
A 39 year old woman with new onset dyspnea

Initial presentation

• Ms. Hernandez has been well until about 6 months ago when she started to get more short of breath.
• One day she felt particularly badly and went to a urgent care facility.
• Her vitals were normal and she was told that she had asthma and was given bronchodilators.
• She continued to have symptoms and the bronchodilators only helped a little.
• She presents to your clinic for an additional opinion.
  • She has no fever and no significant cough
39 year old with dyspnea-2

Differential diagnosis from history

1. Asthma
2. Pulmonary parenchymal disease
3. Dilated cardiomyopathy
4. Mitral stenosis
5. Type I pulmonary hypertension
6. Pulmonary thromboembolic disease
7. Any of the above
What is dyspnea?

Merriam-Webster Dictionary

- Difficult or labored breathing.
What is dyspnea?

American Thoracic Society

• Dyspnea is a term used to characterize a subjective experience of breathing discomfort that is comprised of qualitatively distinct sensations that vary in intensity. The experience derives from interactions among multiple physiological, psychological, social, and environmental factors, and may induce secondary physiological and behavioral responses.
Why do people feel short of breath?

Not as straight forward as it would seem

• Dyspnea may be of neurogenic, respiratory, or cardiac origin, and may be associated with conditions such as anemia, deconditioning, or anxiety.

• It is not just a matter of hypoxia!
General Overview

• Cardiac

• Pulmonary
However, there are other causes of dyspnea

- Anemia
- Metabolic acidosis
- Deconditioning
- Neuromuscular weakness
  - Guillain-Barre syndrome
  - Myasthenia Gravis
  - Duchenne muscular dystrophy
39 year old with dyspnea

Physical examination

- Vital signs are normal, Oxygen saturation is 95%
- Lungs are clear without rales, wheezes or rhonchi
- Cardiovascular exam: Regular rhythm with normal S1 and increased S2. There is a right ventricular precordial impulse. No significant murmurs, rubs or gallops
- The jugular venous pressure is elevated at 9 cm above the right atrium.
- There is no significant edema
39 year old with dyspnea

Initial laboratory data

- CBC, and BMP are normal
- The patient is found to have anti-phospholipid antibody
Most common causes of chronic dyspnea

- Asthma
- Chronic obstructive pulmonary disease (COPD)
- Interstitial lung disease
- Myocardial dysfunction
- Obesity/deconditioning
There are a limited number of causes for sudden/acute onset dyspnea

- Cardiovascular
  - Acute myocardial ischemia
  - Heart failure
  - Cardiac tamponade
  - Pulmonary embolus
- Respiratory
  - Bronchospasm
  - Pneumothorax
  - Pulmonary infection
  - Upper airway obstruction
Approach to the patient with dyspnea

Time to put on your “thinking cap”
Approach to the patient with dyspnea

• Cardiovascular
  – History of CV disease?
  – Symptoms of heart failure?
  – Risk factors for pulmonary vascular disease?
  – Abnormal cardiovascular exam
  – Signs of fluid overload?

• Pulmonary
  – History of lung disease?
  – Signs and symptoms of pulmonary infection?
  – Abnormal lung exam

• Other
  – Bleeding history?
  – Metabolic disease?
  – Good exercise program?
  – Signs of muscle wasting?
Approach to the patient with dyspnea

Additional evaluation to consider

- **Cardiovascular**
  - CBC, CMP, TSH,
  - BNP
  - Possible troponin
  - Electrocardiogram
  - CXR
  - Echocardiogram
  - Possible stress test

- **Pulmonary**
  - CBC, CMP, TSH
  - CXR
  - Spirometry
  - Stress test or 6 minute walk test

- **Other**
  - CBC, CMP, TSH, CPK
  - Stress test/metabolic stress test with peak VO2
  - Sleep study
Advanced testing for suspected cardiovascular disease

• If stress test suggests the possibility of coronary artery disease, consider referral for cardiac catheterization

• If there is evidence of cardiomyopathy, coronary artery disease should be ruled out by either stress test, or catheterization if the suspicion of CAD is moderate or high

• If there is suspicion of pulmonary hypertension, right heart catheterization is needed to be certain and to determine the type of pulmonary hypertension that may be present

• If pulmonary hypertension present, additional evaluation may be needed to determine the cause
History

Severity of dyspnea

• “When does the shortness of breath occur— at rest, with exercise or other?”
• “Can you climb a flight of stairs?”
• “Do you have a regular exercise program?”
• “When did it begin?”
History

Associated symptoms

- Fever
- Cough
- Sputum
- Orthopnea
- PND
- Edema
- Chest Pain
Physical examination

- Abnormalities in the lung exam
  - Wheezing
  - Rales
  - Rhonchi
  - Signs of effusion
  - Intercostal muscle retraction, etc
- Abnormalities in Cardiovascular Exam
  - Jugular Venous Pressure
  - Rate and Rhythm of pulse
  - Heart sounds
  - Murmurs
  - Apical impulse
  - Right ventricular lift or tap
  - Other evidence of arterial or venous disease
Laboratory data

- Routine labs
  - CBC, Metabolic panel, Thyroid function
  - Type-B Natriuretic Peptide (BNP)

- Others based on differential diagnosis
  - Troponin
  - ECG
Patient with acute shortness of breath
39 year old woman with dyspnea
Echocardiogram

Useful to evaluate

- Pulmonary artery pressure
- Valvular disease
- Ventricular function
Echocardiogram-pulmonary hypertension

Right heart abnormalities generally resolve in days post PEA
Echocardiography in PAH

Tricuspid regurgitation (TR)

Syst PAP = Right ventricular systolic pressure
(in absence of pulmonary outflow obstruction)
RVSP = 4v² + RAP*

Velocity of the tricuspid regurgitation can be used to predict right ventricular/pulmonary artery pressure.
If suspicion for pulmonary hypertension is high, right heart catheterization is the most definitive way to assess PA pressure.
Ventilation/Perfusion Scan

Ventilation

Perfusion

Normal

Abnormal
39 yo woman with anti-phospholipid antibodies

CT Angiogram with “few, distal abnormalities”
Left Pulmonary Angiogram
Right Pulmonary Angiogram
Clot from same patient
Distal, type III disease
Hemodynamics

- Pre-op hemodynamics:
  - RA 6
  - PAP 95/30 (52)
  - TD CO 2.1, CI 1.1
  - PVR 1783
  - On Remodulin

- Post-op hemodynamics:
  - RA 7
  - PAP 37/12 (21)
  - TD CO 5.3, CI 2.7
  - PVR 211
  - Off PH meds
Easily missed cardiovascular causes of dyspnea

- Pulmonary hypertension
  - Pulmonary emboli
  - Chronic pulmonary thromboembolic pulmonary hypertension
- Valve disease
  - Mitral stenosis
  - Aortic or congenital pulmonic stenosis
- Congenital heart disease
  - Atrial septal defect
  - Diastolic dysfunction
- Pericardial disease