

C3: Dyspnea Part 1

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** Drug doses are a guide only, always check second source and follow local practice guidelines*

Take Home Points

- A-B-Cs, if unstable follow ACLS protocols
- Dyspnea often indicates a life-threatening process and undifferentiated patients should be monitored closely as the workup proceeds
- Most patients presenting with dyspnea with have a cardiopulmonary cause but unless specifically considered, other life-threats may be missed such as airway obstruction, neurologic, metabolic and hematologic disease, as well as toxins.

INTRODUCTION

Last month on C3, we dealt with the approach to GI bleeding. In fact, the patient that we interviewed presented to the ED with shortness of breath - e.g. dyspnea was the presenting complaint of his GI bleed. This underscores the message of this episode of C3 - that the differential diagnosis of dyspnea is broad - and that we sometimes have to look beyond the heart and lungs to make the diagnosis.

Most patients with dyspnea will have a common cardiopulmonary cause: pneumonia, CHF, pulmonary embolism, MI, asthma, COPD, cardiac tamponade, etc. For the sake of our learning, in Part 1 we are going to deal with all of the other major causes of dyspnea that are often missed when we assume a cause in the heart and lungs. In Part 2, we will dive into the most common cardiopulmonary causes.

Another caveat, patients who are IN EXTREMIS - they are in distress or unstable and look as though they may be close to cardiac arrest - will require urgent intervention.

Despite the broad differential of dyspnea, when these patients “crash”, they will require prompt resuscitation with ACLS-type protocols - at the same time as we are trying to figure out the underlying cause. For the purpose of this discussion, we are assuming that we are dealing with a somewhat stable patient that can talk to you and examine.

BACKGROUND

- Dyspnea is a symptom - a sensation of shortness of breath
- It is a very common presenting complaint with several million ED visits/year in US
- Although cardiopulmonary causes (such as CHF and pneumonia) underlie dyspnea in the majority of cases, an important minority of cases are due to serious and life-threatening diagnoses in *other* systems
- These include a source of dyspnea from:
 - Airway obstruction (e.g. epiglottitis)
 - Neurologic disease (e.g. Guillain-Barre syndrome)
 - Metabolic disorders (e.g. acidosis)
 - Hematologic disorders (e.g. anemia)
 - Toxins (e.g. carbon monoxide)
 - Psychiatric disease (e.g. anxiety)

MANAGEMENT

- IV/O₂/monitor/advanced airway equipment at bedside
 - Even in the patient with normal vital signs, the chief complaint of dyspnea is one to take seriously. Especially in older patients, we should error on the side of having them monitored and be prepared to intervene quickly.
- Supplemental O₂
 - The initial O₂ saturation reading is an important data point

- O₂ is a drug and it is not benign - recent medical literature has highlighted that unnecessary and excessive supplemental O₂ can be bad for patient outcomes
- It is reasonable to provide supplemental O₂ to patients with dyspnea if they have low O₂ saturation or if it provides them symptomatic relief
- One caveat is the patient with COPD:
 - Care should be taken to avoid Usually an O₂ sat in the 88-92% range is baseline for patients with severe COPD
 - These patients may require a higher saturation in an emergency but they must be carefully monitored as providing excessive concentrations of O₂ (FiO₂) can lead to apnea.
- Common Orders
 - **ECG:** An important test in adults with undifferentiated SOB
 - Timeliness of ECG is also important in many cases
 - For example, a 70 year old woman who presents with new acute dyspnea should have an ECG within minutes of arrival to ensure that we are not dealing with a STEMI
 - **CXR:** Extremely helpful early on to rule out several life threatening processes
 - **LABS:** Several labs are commonly sent
 - **Troponin** - used as a screen for myocardial infarction but sensitive assays also can be positive in many other causes of dyspnea
 - **D dimer** - used as a screen for thromboembolic disease (e.g. pulmonary embolism) but many causes of false negatives and positives
 - **BNP** - used as a screen for congestive heart failure (CHF) and helpful to rule out if negative but often positive in other causes of dyspnea (e.g. pulmonary embolism)

- We recommend a selective rather than a “shotgun” approach to ordering these tests as it can be problematic interpreting positive values when clinical suspicion doesn’t match with these results!
- **ASA:** should be administered to anyone who is not allergic who may be having an acute MI
 - ASA (generally 162 mg) should be crushed and swallowed for immediate absorption
 - We administer in patients with acute exacerbation of CHF because cardiac ischemia may be the cause
- **NTG:** administer as you would in a patient with acute chest pain if you think that the SOB may be an anginal equivalent
- **BiPAP:** bilevel positive airway pressure applied by face or nasal mask
 - Can be tried in patients with more severe dyspnea
 - Its empiric use does not require a definitive diagnosis
 - Use of BiPAP often requires significant coaching and reassurance by staff (e.g. respiratory therapist) at bedside
 - If used, the idea is to use it early on, before the patient tires, in an effort to avoid endotracheal intubation

BEYOND THE HEART AND LUNGS - THE “EXTRA-THORACIC” CAUSES OF DYSPNEA

AIRWAY OBSTRUCTION

- Adults with airway issues aren’t as obvious as children, who more commonly present with stridor
 - e.g. epiglottitis, retropharyngeal abscess may be sneaky
- Kids with airway issues
 - Stridor, drooling
 - Positioning: tripodding, obvious work of breathing, retractions



- Don't pull them away from mom (upon arrival keep room quiet and calm)
- If you suspect upper airway obstruction avoid oral exam
- Get experienced backup ASAP

- Physical exam:
 - Consider deep space infections
 - Trismus (ask them to open mouth)
 - Back of throat symmetry (e.g. peritonsillar abscesses)
 - Voice changes: a muffled voice may be the only signs of epiglottitis and retropharyngeal abscess

- Imaging:
 - **X-ray** - a simple soft tissue lateral of the neck will suggest or identify most cases of epiglottitis and retropharyngeal abscess in adults
 - **CT** (usually of neck with contrast) - can be in complex, extensive cases to further delineate anatomy
 - **Endoscopy** - direct visualization of airway, can be by ENT consultant

NEUROMUSCULAR

- Neuromuscular disease may present as dyspnea due to weakness of the muscles of breathing

- Wound botulism in a patient using IV heroin is a classic example

- How can I detect a neuromuscular cause?
 - A good neuro exam - especially cranial nerves (often affected in **myasthenia gravis**) and reflexes (distal reflexes usually disappear in **Guillain Barre syndrome**)
 - Measuring respiratory effort - respiratory therapy can help by measuring a forced vital capacity - significant decreases predict the need for intubation.



- It is critical to monitor patients with a possible evolving neuromuscular condition carefully as they may evolve quickly to an inability to breath without assistance.

HEMATOLOGIC

- Anemia is a very common and important cause of dyspnea
 - GI Bleeding and post-chemotherapy are common causes
- Bedside POC HgB is key to making this diagnosis early
- ECG in these patients may show signs of ischemia (focal or widespread ST segment depressions) and may help in the decision of whether to transfuse

TOXICOLOGIC

- **Carbon monoxide (CO)** toxicity, like anemia, results in a global decrease in the amount of oxygen that the blood can carry to the tissues
- The heart (myocardial ischemia, shortness of breath) and the brain (headache, stroke like symptoms) are key organs affected and to watch out for
- One would suspect CO when:
 - Flu-like symptoms (headache, shortness of breath, fatigue) are shared by several members in the same home or workplace
 - Involvement of pets (because they also suffer from CO poisoning *but not* human flu viruses)
 - Environmental risks (e.g. indoor cooking, faulty heaters in colder climates)
- **Methemoglobinemia (MetHb)** also results in a global decrease in the amount of oxygen that the blood can carry and can present similarly to CO
 - Met Hb is often precipitated by medications that are strong oxidizing agents like topical anesthetics, nitrite and some antibiotics
 - Patients will have central cyanosis with MetHb levels > 1.5 g/dL

- **ASA** - in addition to the metabolic acidosis it causes, ASA exerts an independent central effect that results in the sensation of dyspnea and hyperventilation

METABOLIC

- The most important metabolic cause of dyspnea is acidosis
- The classic physical examination finding in acidosis is deep and fast “air-hunger” or Kussmaul breathing
- Look for low pH on venous or arterial blood gas and low serum HCO₃ levels
- Metabolic acidosis can be from many causes, most commonly
 - **sepsis**
 - **diabetic ketoacidosis**
 - toxin (toxic alcohol like methanol)
- Look for signs of sepsis on H+P:
 - Fever/hypothermia
 - Other vital sign changes (e.g. low BP, High pulse)
 - Another symptom (GI, GU, Pulm, skin) to indicate a source of infection
 - Lactate level is a key lab to obtain and follow in sepsis
 - If you think it's sepsis, time is of the essence - early broad spectrum antibiotics and fluids need to be administered
- DKA can look very similar and co-exist with sepsis
 - Serum electrolytes and urine/serum ketones can be used to make the diagnosis
 - Initial treatment is with fluids and insulin - be careful with the potassium!
- There are many other causes of metabolic acidosis. These include organ failure and other causes of shock such as acute hemorrhage

PSYCHIATRIC

- There are several psychogenic causes of dyspnea
- The most common is an anxiety / panic disorder and is often accompanied by hyperventilation
- This is a diagnosis of exclusion and should only be considered once other life-threatening causes have been considered
- Remember that patients may also be anxious from pulmonary embolism or other very serious causes of dyspnea