



PATIENT CARE THEORY 2

Unit 1 Part 2a: Breath Sounds – Crackles and ACPE

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Cardiogenic Pulmonary Edema

- ❖ The accumulation of excessive fluid in the alveolar wall and spaces of the lungs
- ❖ Requires immediate assessment and management
- ❖ High mortality rates
- ❖ Males more than females (typically)

Causes – Pulmonary Edema

❖ Cardiogenic

- Changes in the permeability of the capillaries
- Elevated hydrostatic pressures along the capillary wall
 - Inability of the left ventricle to adequately pump blood to the systemic circulation (Left sided heart failure or CHF)
 - Elevated pulmonary venous pressure
 - MI
 - Dysrhythmias
 - Cardiomyopathy
 - Valvular disease (stenosis)

Causes

❖ Non-cardiogenic

➤ Direct or indirect pathologic insult

- Drowning
- Fluid overload
- Aspiration
- Inhalation injury
- Drug overdoses
- Neurogenic pulmonary edema
- Acute kidney disease
- Allergic reactions/anaphylaxis
- ARDS

Causes

❖ Pathophysiology

“Increased pressure/pooling--> Increased pulmonary venous pressure--> Increased pulmonary capillary pressure--> fluid in interstitial spaces--> Increased pressure in Interstitial spaces--> fluid in alveoli (pulmonary edema).”

HPI

❖ Chief complaint of SOB

- Can be acute (minutes to hours) or gradual onset (hours to days)
- Worsens on exertion or laying down (orthopnea)
- Anxiety and feelings of drowning or suffocation
- Cough
- *Blood tinged or pink frothy sputum*
- +/- chest pain
- Cool, clammy, diaphoresis

HPI

❖ Chronic

- Dyspnea on exertion
- Orthopnea (usually will sleep propped up on multiple pillows or in recliner type chair)
- Paroxysmal nocturnal dyspnea (PND)
- Peripheral edema/ weight gain
- fatigue

Physical Exam

❖ General Appearance

- Confused, altered LOA
- Diaphoretic, pale, cyanosis
- Combative
- Dyspnea and laboured respiratory effort
 - Accessory muscle use
 - SCM indrawing
 - Heaving shoulders
 - Air hunger/gasping
- Elevated JVP

Physical Exam

- ❖ Usually hypertensive
 - If hypotensive then possible cardiogenic shock
- ❖ Tachycardia
- ❖ Tachypnea

Left sided

- ❖ Fatigue
- ❖ Orthopnea
- ❖ Cough/wheeze/ crackles
- ❖ Angina type pain
- ❖ hypoxia

Right-Sided

- ❖ Peripheral edema (varying degree of pitting)
- ❖ Hepatomegaly (usually associated with right-sided failure)
- ❖ Ascitis (+/-)
- ❖ Elevated JVP

Physical Exam

❖ Auscultation

- Fine crackles in the bases initially
 - Can be mistaken for wheezing in early phases (cardiac asthma)
 - Typically heard at the end of the inspiratory phase
- progress apically as edema increases and worsens (a much fuller “coarser” sound
 - Think crinkling tissue paper vs boiling stew

❖ Course crackles

- Louder lower pitched and longer lasting sound
 - Typically found in COPD exacerbations, pneumonia
 - Can be present in ACPE

CRACKLES



Heart Failure

- ❖ Can affect the left side, right side, or both
- ❖ Left sided:
 - Left ventricle is unable to overcome afterload and pump enough blood to the systemic circulation
 - Blood builds up in the pulmonary veins
 - Causes coughing and SOB/OE
 - Most common type
- ❖ Caused by CAD, MI, long term HTN, cardiomyopathy

Heart Failure

❖ Right-sided

- Right ventricle is unable to pump blood volume to the lungs
- Causes back up in the venous system
- Often a result of advanced left sided HF, pulmonary hypertension, PE or COPD
- Cor Pulmonale – when the Rt ventricle is enlarged secondary to pulmonary HTN (and chronic respiratory disease) leading to failure

❖ Bi-ventricular heart failure

- Both sides of the heart affected
- Signs and symptoms of both
 - Peripheral edema, SOB, cough

LEFT SIDED ❤️ FAILURE

- Paroxysmal Nocturnal Dyspnea
- Elevated Pulmonary Capillary Wedge Pressure
- Pulmonary Congestion
 - Cough
 - Crackles
 - Wheezes
 - Blood-Tinged Sputum
 - Tachypnea
- Restlessness
- Confusion
- Orthopnea
- Tachycardia
- Exertional Dyspnea
- Fatigue
- Cyanosis



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RIGHT SIDED ❤️ FAILURE

(Cor Pulmonale)

- Fatigue
- ↑ Peripheral Venous Pressure
- Ascites
- Enlarged Liver & Spleen
- May be secondary to chronic pulmonary problems
- Distended Jugular Veins
- Anorexia & Complaints of GI Distress
- Weight Gain
- Dependent Edema



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Management

- ❖ O₂ 100% NRB*
- ❖ Cardiac monitor
- ❖ Position
- ❖ NTG, CPAP
- ❖ IV prn
- ❖ Consider underlying cause (MI, Dysrhythmia, ingestion, infection)
- ❖ Rapid transport



Questions??

References

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