

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

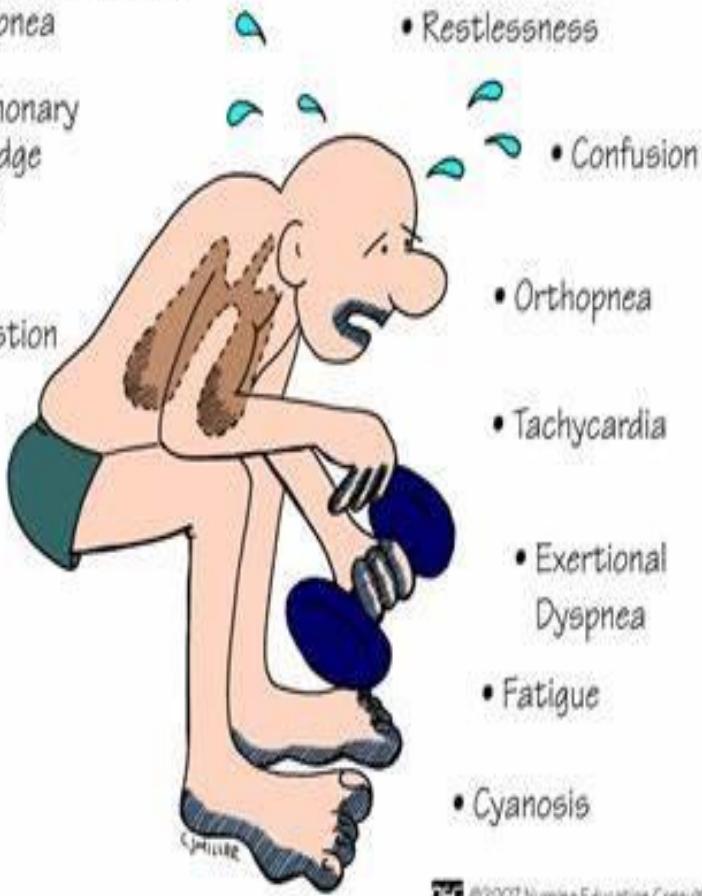
- ❖ Can affect the left side, right side, or both
- ❖ Left sided:
 - Left ventricle is unable to overcome afterload and pump enough blood to the systemic circulation
 - Blood builds up in the pulmonary veins
 - Causes coughing and SOBOE
 - Most common type
- ❖ Caused by CAD, MI, long term HTN, cardiomyopathy

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



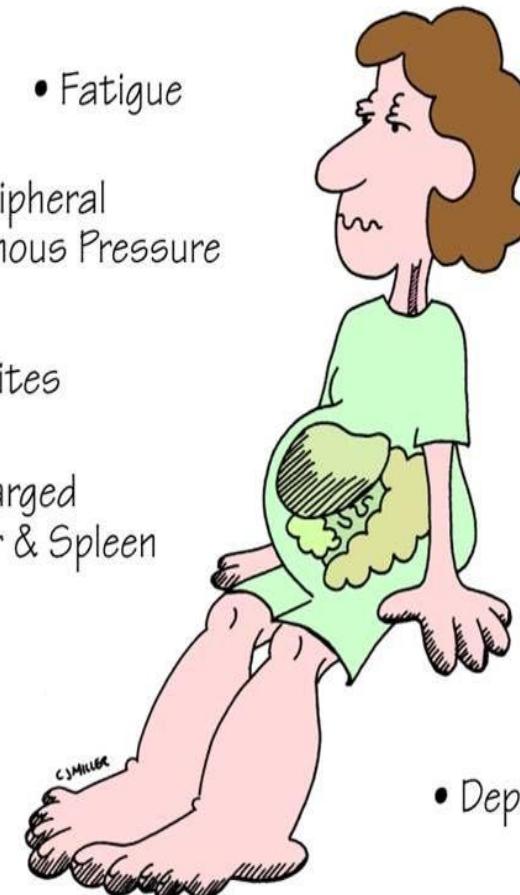
- Restlessness
- Confusion
- Orthopnea
- Tachycardia
- Exertional Dyspnea
- Fatigue
- Cyanosis

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RIGHT SIDED ❤ FAILURE

(Cor Pulmonale)

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



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Management

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

A faint, grayscale watermark-like image of a medical professional wearing a white coat and a surgical mask is visible in the background.

Questions??

References

- ❖ Iqbal MA, Gupta M. Cardiogenic Pulmonary Edema. [Updated 2021 Jul 2]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2021 Jan-. Available from: <https://www.ncbi.nlm>
- ❖ [Types of heart failure - InformedHealth.org - NCBI Bookshelf \(nih.gov\).nih.gov/books/NBK544260/](https://www.ncbi.nlm)