**Title: All Roads Lead to Rome – Discovering More Than One Culprit Causing Pulmonary Hypertensive Crisis**

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**Introduction:**

Pulmonary hypertensive crisis occurs when acute rise in pulmonary vascular resistance (PVR) leads to right ventricular failure. We present a complex case of pulmonary embolism (PE) with pneumonia complicating an undiagnosed atrial septal defect (ASD) and pulmonary hypertension (PH).

**Case description:**

A 24 years old lady with prior COVID-19 infection was presented with cough, fever, sudden onset of transient left lower limb numbness and reduced effort tolerance. Upon examination, she was tachycardiac and tachypnoeic with oxygen saturation of 88% under room air. ECG showed sinus tachycardia with right axis deviation; while transthoracic echocardiogram (TTE) revealed dilated right ventricle (RV) and right atrium (RA), as well as D-shaped left ventricle (LV). Moreover, deep vein thrombosis was detected in bilateral lower limbs with a 2-point compression test. She was intubated following respiratory failure. CTPA showed filling defects involving distal right main pulmonary artery, interlobular and segmental branches, as well as left lower lobe segmental artery. Trans-esophageal echocardiogram (TEE) revealed dilated pulmonary artery with elevated PASP of 71mmHg and a large ASD measuring 2.2cm. Despite mechanical ventilation, patient remained hypoxemic. Systemic thrombolysis was administered and milrinone was started to lower pulmonary pressure. Patient recovered with a good neurological outcome.

**Discussion**

Pulmonary hypertension (PH) is categorized based on common pathophysiological  processes, haemodynamic characteristics, clinical presentation and management (1). In this case, the patient had an undiagnosed ASD which causes left-to-right shunt, leading to development of PH (2). A past history of COVID-19 infection predisposed the patient to thromboembolic complications(3). Our patient developed bilateral lower limb DVT and extensive pulmonary embolism (PE). A large embolus in the pulmonary artery results in acute rise in pulmonary vasculature and right heart pressure, leading to right-to-left shunt. This further exacerbates hypoxemia from ventilation-perfusion (V/Q) mismatch due to PE. The clinical presentation of cough and infiltrates on chest radiography is suggestive of pneumonia where hypoxic pulmonary vasoconstriction can worsen pulmonary hypertension.

**Conclusion:**

There can be more than one culprit causing pulmonary hypertensive crisis. Detection of the ASD via POCUS is a crucial finding to suggest pre-existing PH on top of the acutely increased PVR due to PE (4). This focuses our clinical management toward treatment of pulmonary hypertensive crisis.

**Keyword: ASD, pulmonary hypertensive crisis**

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