ECRONICON OPEN ACCESS

EC PULMONOLOGY AND RESPIRATORY MEDICINE

Conceptual Paper

Can COPD Exalt the Risk of Pulmonary Embolism? A Scientific Discourse

Anand Agrawal[1]*, Kamaljeet Singh[2], Sunaina Kharb[2] and Shikha Goel[3]

[1]*Professor and Head, BPSGMCW KK Sonepat, Haryana, India*

[2]*Assistant Professor, BPSGMCW KK Sonepat, Haryana, India*

[3]*Assistant Professor, Department of Pathology, NC Medical College Panipat, Haryana, India*

***Corresponding Author:** Anand Agrawal, Professor and Head, Department of Respiratory Medicine, BPSGMCW KK Sonepat, Haryana, India.

Received: December 31, 2021; **Published:** January 31, 2022

COPD is a third leading cause of death globally due to persistent airflow limitation which may lead to systemic complications and respiratory failure. Recent research promulgate that patients with COPD are prone to gain Pulmonary embolism (PE) due to tenacious systemic inflammation [1]. A retrospective cohort study stunningly reveals that risk of pulmonary embolism among COPD patients is around 4 times compare to non COPD population. According to researchers increase in platelet distribution width (PDW) among COPD patients strongly related to occurrence of Pulmonary embolism, besides this oxidative stress, hypercoagulable state, as well as endothelial dysfunction may also enhance the risk of embolism [2].

Somehow sudden deterioration of respiratory symptoms in COPD are similar to PE, moreover the incidence of DVT in patients with COPD was reported merely 10 - 12% and clinically asymptomatic, hence recognizing AE-COPD combined with PE is quite challenging to determine whether manifestations are either due to AE-COPD or PE or both [3]. Recently it was highlighted that one fourth of AE-COPD patients who require hospitalization may have PE [4]. In a contemporary meta-analysis conducted by Fu X by including 17 studies involving 3170 patients emphasize that the pooled prevalence of pulmonary embolism was 17.2%, also inscribe that AE-COPD with PE enhance mortality, among ICU patients [5]. However according to Aleva FE., *et al*. pooled prevalence of PE in unexplained AE-COPD was 16.1% (95% CI, 8.3% - 25.8%) in a total of 880 patients by including 7 studies in systematic review [6]. Barring this in a legendry retrospective postmortem analysis, pulmonary embolism was the major cause of death in 21% of patients admitted for acute COPD exacerbation [7]. Contrary to this Couturaud F., *et al*. behold that prevalence of pulmonary embolism in hospitalized COPD patients for acutely worsening respiratory symptoms was only 5.9%, though small sample size may be a major constrain to validate inference [8]. In a large retrospective population-based cohort study conducted by Chen WJ., *et al*. included 355,878 COPD patients and 355,878 non-COPD patients, proclaim that risk of PE was higher in patients with COPD if combined with hypertension, cardiac ailment, or malignancy compare to COPD without comorbidity [9].

Patients with COPD in type 2 respiratory failure stimulate hematopoietic function to induce a compensatory increase in polycythemia lead to elevations in blood viscosity; for bye reduction in erythrocyte deformability, sluggish blood flow and acid-base derangement also precipitate hyper-coagulable state of blood [10]. Liu M., *et al*. unveil that Coagulation dysfunction was common in AECOPD patients moreover PT/APTT were significantly prolonged together with elevated Fibrinogen in the AECOPD patients. The prolongation of the coagulation parameters (such as APTT and PT) might be caused by the consumption of clotting factors, in addition high concentration of blood carbon dioxide and acidosis may lead to dysfunction of coagulation factors and endothelial cell damage [11]. However White H., *et al*. disseminate that severity of the acidosis in terms of pH, among COPD patients with type 2 Respiratory failure, had clinically insignificant impact on the coagulation profile [12,13].

It was also recognize that alveolar macrophages, bronchial epithelial cells and lymphocytes, are linked with pulmonary inflammation, which produce interleukin (IL)-6 and IL-1β. These cytokines, deluge into the systemic circulation may stimulate hepatocytes to synthesize CRP and fibrinogen. Hydrogen peroxide (H_2O_2) have also been found to be elevated in exhaled breath of COPD patients; consider as sur-

rogate marker of oxidative stress in the lungs. While Pulmonary oxidative stress flare out to the circulation can promote the peroxidation of polyunsaturated fatty acids may generate F2-isoprostanes, which can be detected in urine and consider as reliable marker of systemic oxidative stress; a key event in the pathogenesis of atherosclerosis; may implicate in pulmonary embolism [14].

In a riveting interventional study conducted by Shi X., *et al*. by administering anticoagulation therapy in COPD patients with acute exacerbation, perceive that D-dimer level and blood coagulation indicators (International normalized ratio (INR), prothrombin time (PT), activated partial thromboplastin time (APTT) and fibrinogen (FIB); concentration of study group were significantly improved, compare to control group [10].

Therewithal smoking may enhance activation of platelets by 100 times, which can lead to significant increase in blood clot and play major confounding effect with COPD in the pathogenesis of pulmonary embolism [15]. However according to case control study conducted in Africa; Cigarette smokers tend to have lower platelet counts, shorter PT, and INR values, compared to non-smokers; might be associated with bleeding disorders; though it need extensive research worldwide for further endorsement [16].

Pathogenesis of pulmonary embolism is astonishingly high among hospitalized COPD patients beyond the expectation; though undermined due to lack of sensitization about its clinical manifestation, hence it need more precise workup among patients with unexplained AE-COPD, by the treating physician especially when pleuritic chest pain and signs of cardiac failure are present, without any evidence of infectious origin. Moreover, it need further comprehensive research at molecular level to find out its exact etio-pathogenesis to consolidate the hypothesis to flag whether COPD can be consider as an independent risk factor for pulmonary embolism to formulate standard guideline for the management by the eminent scientific societies.

Bibliography

1. Tillie-Leblond I., *et al*. "Pulmonary embolism in patients with unexplained exacerbation of chronic obstructive pulmonary disease: prevalence and risk factors". *Annals of Internal Medicine* 144.6 (2006): 390-396.

2. Yang R., *et al*. "Pulmonary embolism with chronic obstructive pulmonary disease". *Chronic Diseases and Translational Medicine 7*.3 (2021): 149-156.

3. Moua T and Wood K. "COPD and PE: a clinical dilemma". *International Journal of Chronic Obstructive Pulmonary Disease* 3.2 (2008): 277-284.

4. Rizkallah J., *et al*. "Prevalence of pulmonary embolism in acute exacerbations of COPD: a systematic review and metaanalysis". *Chest* 135.3 (2009): 786-793.

5. Fu X., *et al*. "The prevalence and clinical features of pulmonary embolism in patients with AE-COPD: A meta-analysis and systematic review". *PLoS One* 16.9 (2021): e0256480.

6. Aleva FE., *et al*. "Prevalence and Localization of Pulmonary Embolism in Unexplained Acute Exacerbations of COPD: A Systematic Review and Meta-analysis". *Chest* 151.3 (2017): 544-554.

7. Zvezdin B., *et al*. "A postmortem analysis of major causes of early death in patients hospitalized with COPD exacerbation". *Chest* 136.2 (2009): 376-380.

8. Couturaud F., *et al*. "Prevalence of Pulmonary Embolism Among Patients With COPD Hospitalized With Acutely Worsening Respiratory Symptoms". *The Journal of the American Medical Association* 325.1 (2021): 59-68.

9. Chen WJ., *et al*. "Pulmonary embolism in chronic obstructive pulmonary disease: a population-based cohort study". *COPD* 11.4 (2014): 438-443.

10. Shi X and Li H. "Anticoagulation therapy in patients with chronic obstructive pulmonary disease in the acute exacerbation stage". *Experimental and Therapeutic Medicine* 5.5 (2013): 1367-1370.

11. Liu M., *et al*. "Coagulation dysfunction in patients with AECOPD and its relation to infection and hypercapnia". *Journal of Clinical Laboratory Analysis* 35.4 (2021): e23733.

12. White H., *et al*. "An in vitro analysis of the effect of acidosis on coagulation in chronic disease states - a thromboelastograph study". *Clinical Medicine* 16.3 (2016): 230-234.

13. Undas A., *et al*. "Thrombin generation in chronic obstructive pulmonary disease: dependence on plasma factor composition". *Thrombosis Research* 128.4 (2011): e24-e28.

14. Fimognari FL., *et al*. "Mechanisms of atherothrombosis in chronic obstructive pulmonary disease". *International Journal of Chronic Obstructive Pulmonary Disease* 3.1 (2008): 89-96.

15. Ngozi SC and Ernest NE. "Long-term smoking results in haemostatic dysfunction in chronic smokers". *Nigerian Medical Journal* 55.2 (2014): 121-125.

16. Elkhalifa AM. "Effects of cigarette smoking on coagulation screening tests and platelet counts in a Sudanese male adults population". *Saudi Medical Journal* 39.9 (2018): 897-901.

Volume 11 Issue 2 February 2022