

Can We Consider All the Cases of COPD Associated with COVID-19 Suffer from Acute Respiratory Failure?

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Abstract

Chronic obstructive pulmonary disease (COPD) is the third driving reason for death around the world. While COPD is a respiratory illness having various aetiologies especially ceaseless infection, a considerable number of patients experience the ill effects of exacerbation. Extreme exacerbation is identified with an altogether more regrettable result. This survey sums up the present information on the various parts of COPD exacerbations and acute respiratory failure in COPD patients with COVID-19. The effect of hazardous factors and triggers, for example, smoking, extreme wind current restriction, bronchiectasis, bacterial and viral contaminations, and comorbidities is talked about. Increasingly serious exacerbations ought to be treated with β -agonists and anticholinergics just as foundational corticosteroids. Anti-microbial treatment should just be given to patients with assumed bacterial contamination. Non-invasive ventilation is demonstrated in patients with respiratory disappointment. Treatment of hypoxemia and hypercapnia lessen the pace of COPD intensifications.

In December 2019, a flare-up of coronavirus disease 2019 (COVID-19) was recognized in Wuhan, China. The World Health Organization (WHO) pronounced this episode a noteworthy danger to worldwide wellbeing. COVID-19 is exceptionally irresistible and can prompt lethal comorbidities particularly in chronic obstructive pulmonary disease (COPD) patients. Consequently, completely understanding the qualities of COVID-19 in patients with (COPD) is helpful for early distinguishing proof and appropriate treatment. The clinical indications were generally mellow in some COVID-19 patients, which was conflicting with the seriousness of research facility and imaging discoveries. The seriousness was re-imagined into three phases as per its particularity: gentle, mellow moderate, and moderate-extreme. The almost certain reason for death is serious respiratory failure. Along these lines, the planning of intrusive mechanical ventilation is significant. The impacts of corticosteroids in COVID-19-(COPD) patients were helpful to some point.

Keywords: COPD (Chronic Obstructive Pulmonary Disease); COVID-19

Abbreviations

COPD: Chronic Obstructive Pulmonary Disease; COVID-19: Coronavirus Disease 2019; CT: Computed Tomography; HFNO: High-Flow Nasal Oxygen; ICU: Intensive Care Unit; LDH: Lactate Dehydrogenase; PEEP: Positive End-Expiratory Pressure; SARS-Cov-2: Severe Acute Respiratory Syndrome Coronavirus 2; V-A ECMO: Venous-Arterial Extracorporeal Membrane Oxygenation; V-V ECMO: Venous-Venous Extracorporeal Membrane Oxygenation; WHO: World Health Organization; ICS: Inhaled Corticosteroid; OCS: Oral Corticosteroid

Introduction

COPD is the third driving reason for death around the world [1]. While COPD is a respiratory illness having various aetiologies especially ceaseless infection, a considerable number of patients experience the ill effects of exacerbations. Extreme intensifications are identified with an altogether more regrettable endurance result [2]. The Global Initiative for Chronic Obstructive Lung Disease (GOLD) 2017 report refined the ABCD assessment tool, to utilize respiratory symptoms and exacerbations alone to assign ABCD categories [3]. The effect of hazard factors and triggers, for example, smoking, extreme wind current restriction, bronchiectasis, bacterial and viral contaminations, and comorbidities is talked about. Increasingly serious exacerbations ought to be treated with β -agonists and anticholinergics just as foundational corticosteroids [4]. Anti-microbial treatment should just be given to patients with assumed bacterial contamination. Non-invasive ventilation is demonstrated in patients with respiratory failure. Smoking discontinuance is vital to forestall further COPD intensifications [5]. Different angles incorporate the decision of pharmacotherapy, including bronchodilators, breathed in corticosteroids, phosphodiesterase-4 inhibitors, long haul anti-infection agents, and mucolytics [6]. Better training and self-administration just as expanded physical action are significant. Treatment of hypoxemia and hypercapnia lessen the pace of COPD intensifications, while most interventional bronchoscopic treatments increment worsening danger inside the principal months after the technique [7,8].

The World Health Organization (WHO) declared it as a threat to global health [9]. COVID-19 was of acute/sub-acute onset and respiratory system was effected primarily. These patients were likely to be admitted to the intensive care unit (ICU) and might become seriously ill and expire. Patients with increasing age and associated with comorbidities are at a high risk of death. The death appeared to be related to acute respiratory failure [10]. Even though several studies reported the symptoms, signs and progression of COVID19 [11], there is still much to learn about it [12]. Can we consider all the cases of COPD associated with COVID-19 suffers from acute respiratory failure?, The answer is probably no. Based on current reports and researches in the management of COVID-19-related (COPD) patients, we realized that there are many differences between COVID-19-related (COPD) and respiratory diseases caused by other factors, and therefore differences in treatment.

The most common respiratory symptom of COVID-19 is dry cough (59.4 - 82%) [13]. Sputum production was scanty. It suggested that injury to the alveolar epithelial cells and increased resistance, which is due to airway obstruction, and a loss of the elastic recoil pressure of the lung, which is due to parenchymal destruction [14] were the main cause of COVID-19 in COPD patients, and endothelial cells were less damaged with therefore less exudation. Blood Vessels in general have endothelial lining as their inner most layer. The system most commonly effected in COVID-19 is respiratory system. Patients having low oxygenation index show severe respiratory failure. Imaging of chest usually shows bilateral lung field involvement. Patients showed bilateral multifocal patchy shadows/ground glass opacities on Chest CT (Computerized Tomography) imaging; there were ground glass opacities with consolidation in some Patients [15]. There is diffuse and severe pulmonary injury on CT scan. Signs and symptoms were relatively mild in some patients. These patients might not have any complaint of dyspnea, nor increase in respiratory rate to significant levels and no respiratory distress. Cardio Vascular system and tissue perfusion indexes such as lactate were also near normal [16]. The clinical features were much severe than what the laboratory and imaging describe. However, these patients can deteriorate rapidly and need to be carefully observed. Monitoring blood CO₂ levels may be a relevant indicator of invasive mechanical ventilation.

Not all the cases of acute respiratory failure were caused by COVID-19, some of them might be due to COPD. The CT findings of COVID-19 typically showed bilateral ground-glass shadows distributed at the lung peripheries [15]. Despite the fact that there was lung consolidation and exudation on CT, it was not a typical finding of COPD. COPD is a condition associated with multiple disease processes leading to reduced lung compliance and airflow restriction [14]. Lung compliance might be near normal in some patients with COVID-19 and COPD. Furthermore, the lung compliance was relatively high which was inconsistent with the severity of airflow hinderance in some patients with COVID-19 COPD. Acute exacerbations of COPD are key events and are associated with faster lung function deterioration [17], worsened health status, and increased mortality [18]. Impaired gas exchange leading to hypoxemia is an important feature of COPD, and is likely to underlie many of its pathophysiological consequences [19].

While the use of supplemental oxygen in stable disease carries a poor prognosis [20] it remains one of the few evidence-based interventions to improve mortality. However, although hypoxemia worsens at exacerbation, there is increasing evidence that injudicious use of oxygen is also dangerous [21].

Hypoxemic respiratory failure occurs due to intrapulmonary ventilation-perfusion mismatch or shunt in COPD patients and usually require mechanical ventilation. High-flow nasal oxygen (HFNO) reduces the need for endotracheal intubation compared to ordinary-oxygen therapy in patients with COPD [22]. For patients with hypoxemic respiratory failure WHO recommends HFNO only to be used in selected few [23]. HFNO can be safe in both mild and mild-moderate COVID-related COPD patients, and even some moderate-severe patients even though studies indicated that it is more suitable for patients with mild COPD. Some patients remained relatively stable having oxygenation index of 100 mmHg with the support of HFNO. This is inconsistent with the stratified treatment strategies of COPD caused by other factors.

Myocardial injury and arrhythmia are the complications which may be associated with COVID-19 as reported [24] but currently there is no evidence that cause of death is myocarditis. Respiratory system is the most common system involved in COVID-19, and some cases can land in acute respiratory failure, which requires venous-venous extracorporeal membrane oxygenation (V-V ECMO) in case of most severe cases. There are no evidences that patients with severe arrhythmia or acute heart failure due to acute myocarditis have been reported to require venous-arterial ECMO (V-A ECMO) treatment till date. Elevation of serum cardiac biomarkers or new abnormalities in electrocardiography and echocardiography are the main diagnostic methods used in myocardial injury. However, serum lactate dehydrogenase (LDH) and creatine kinase-MB were elevated more commonly than hypersensitive troponin I in case of COVID-19 patients as reported [25]. There were no obvious histopathological changes seen in the heart tissue of a COVID-19 COPD patient [26]. Therefore, the diagnosis of acute myocardial injury needs further evaluation. Thus, respiratory failure is the most common cause of death. Therefore, timely invasive mechanical ventilation is very important in case of a COVID-19 COPD patient. Since, condition of severe COVID-19 patients may deteriorate rapidly, patients on HFNO should be closely carefully monitored by experienced personnel like anaesthesiologists or emergency physicians who has an expertise in endo tracheal intubation. Currently recent studies which were published did not report the proportion of different respiratory supports for COVID-19-COPD patients. Therefore, use of HFNO in COVID-19-related COPD patients needs further research and evidence.

The use of steroids in COPD patients with COVID 19

The World Health Organization (WHO) as of late on thirteenth March 2020 suggested against the normal utilization of fundamental corticosteroids in the clinical administration of serious viral pneumonia if coronavirus illness 2019 (COVID-19) is suspected [27]. This is because of the absence of adequacy of routine treatment with corticosteroids and the danger of potential damage as revealed in past writing for viral pneumonia episodes, including Severe Acute Respiratory Syndrome (SARS). Truth is that, SARS-CoV-1 that caused the past SARS episode is identified with the SARS-Coronavirus-2 (SARS-CoV-2) that causes COVID-19 [28].

Since patients with asthma and constant obstructive pulmonary disease (COPD) are a group where the breathed in-corticosteroid (ICS) or oral corticosteroid (OCS) are usually validated, along these lines the disadvantages and advantages of corticosteroid use in this group of patients with or without COVID-19 conclusion is required.

Viral respiratory infections are the most common triggers of exacerbation in COPD patients [29]. This is explained by their propensity to induce proinflammatory cytokines, such as IL-1, IL-6, and IL-11, in the airway epithelial cells [30]. Role of COVID-19 in triggering an exacerbation in COPD patients is still not known, but the subsequent lung inflammation and induction of pro-inflammatory cytokines (including IL-1 and IL-6) in case of COVID-19 suggests that an exacerbation is likely in patients with COPD with COVID-19 infection [31]. Therefore, the main aim of treatment in COPD patients associated with COVID-19 is to decrease the risk of exacerbation that could further compromise the pulmonary function. More frequent use of SABA (short-acting β -agonists) is warranted when symptoms increase and they must be titrated to response in COVID-19 COPD patients [33]. If an acute exacerbation of COPD occurs in the context of COVID-19, there is no specific reason to tell that a different approach than usual approach should be followed in home or outpatient or inpatient management, and clinicians should follow individualized self-management plan of COPD which includes the use of short course of OCS, as delay in the treatment may increase the risk of exacerbation that may be life threatening. Short-term use of OCS in COPD [34] exacerbations facilitates the resolution of exacerbations, prevents the disease progression, helps in early relapse after emergency treatment, and reduces morbidity. The OCS therapy can be stopped abruptly as and when the symptoms subside and lung function improves. The patients presenting with COVID-19 symptoms such as fever, dry cough or myalgia should be informed and educated as to never self start the Oral Corticosteroid therapy (OCS) [35]. The approach mentioned above, along with the management of acute exacerbations of COPD in COVID-19 patients can also be used for the management of severely ill or critically ill patients being treated in emergency care units of hospitals.

In the wake of COVID-19 pandemic, consultant diabetologists and endocrinologists have suggested considering the use of a physiological stress dose of systemic corticosteroids (Hydrocortisone 50 - 100 mg intravenously every 8 hours i.e. three times a day) in hospitalised patients of COPD without an exacerbation with a history of chronic use of inhalational or oral corticosteroids for more than 3 months because of possible secondary corticosteroid induced adrenal insufficiency [36]. However, WHO does not recommend the use of systemic corticosteroids in COVID-19 patients, rather suggests their use on a severity basis in COPD patients that have tested positive [27]. In mild to moderate disease, the use of systemic corticosteroids may not be justified. In critical or severe cases complicated with ARDS or septic shock which are now increasingly being associated with a cytokine storm, the use of systemic corticosteroids may prove to be useful. There are some retrospective studies [37] supporting this, however the clinical experience and the results of ongoing clinical trials from hospitalised COVID-19 patients will prove it.

Inhalers such as metered dose or dry powder inhalers can be used for administering inhalational corticosteroids. In a clinical setting, nebulizer solutions of corticosteroids are used occasionally.

Conclusion

COVID-19 is a highly infectious disease that can lead to fatal co morbidities, especially respiratory failure. As there are no specific recommended COVID-19 treatments available, supportive treatment plays an important role. A full understanding of the characteristics of COVID-19 in COPD would help in early identification and precise treatment.

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