

Postmortem findings in lungs of coronavirus infected patients: a review of literature

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Abstract

Covid 19 is pandemic all over the world. It has been first detected in China in 2019 among people working in animal market. It is caused by corona virus which has close relation to SARS which was first detected in 2007. Coronavirus can produce symptoms which is varied from simple common cold like disease to severe respiratory disease including respiratory distress condition. Most of the postmortem lungs showed histological picture of diffuse alveolar damage, pneumonia, thromboembolism of small sized pulmonary arteries and pulmonary embolism. But those elderly people or those with chronic illnesses they showed more serious and life-threatening symptoms like difficult breathing, dyspnea, chest pain or even loss of speech and movement. This review study focused on the histological findings in the autopsy of lungs in patients died from coronavirus. The present study concluded that the principal cause of death in covid 19 patients is the acute respiratory distress syndrome which showed a histological picture of diffuse alveolar damage, microvascular damage and pulmonary thromboembolism.

Key words: coronavirus, postmortem, lungs

Introduction

The world is facing one of the most disruptive viruses that causes global pandemic and increasing deaths worldwide (1). Coronaviruses are enveloped RNA viruses that can be distributed widely and affect humans, and animals like birds and inducing respiratory system illness that is ranged from simple flu like illness to serious respiratory damage like respiratory distress syndrome (2). All the health care authorities confronting a challenge as covid-19 becomes a significant cause of mortality all over the world but it's not the main cause of death worldwide (3).

Many of patients suffer from mild to moderate sickness and they may recover at home complaining only from mild symptoms like fever, dry cough and generalized malaise (4). But those elderly people or those with chronic illnesses they showed more serious and life threatening symptoms like difficult breathing, dyspnea, chest pain or even loss of speech and movement (5).

The most important complaints for covid-19 patients are fever, headache, cough, and generalized malaise. While the most serious presentation is pneumonia with typical respiratory CT scan findings of covid-19 patients (6). Serious complications are acute respiratory distress syndrome, coagulopathy and viral sepsis which is rare (7).

The postmortem examination biopsies are essential to find out the pathogenesis and the outcome of the virus (8). Damage to the respiratory epithelium and substantial respiratory parenchyma with severe pneumocytes destruction and thrombus of minute vessels were stated (9).

The target of the present study is to assess the recently accessible histological information in autopsies of lung in covid 19 diagnosed patients and to review the global researches on the autopsy findings in lungs of corona virus infected patients.

Methods

The present literature was conducted by electronic search to the following websites and journals (Google scholar, pubmed, Web of science, Elsevier, Science Direct Scopus). In the present study, all the mentioned cases were subjected to biopsies and autopsies. The included researches are case reports, reviews, original articles and full texts.

Covid 19 lung autopsy

Xu *et al.*(10) described a coronavirus case presented with severe respiratory symptoms for two weeks, then he got attack of respiratory failure (PO₂= 60%) which led to cardiac cessation and death. Tissue biopsies of lung were examined and showed diffuse alveolar damage with alveolar membranous hyalinization and edema, excessive lymphocytic and mononuclear cell infiltration with multinucleated alveolar cells.

Yao *et al.*(11) Autopsies of three positive Covid 19 cases (Immunohistochemistry and Polymerase Chain Reaction investigations were positive) were examined. Hyalinization of the alveolar membranes and lumens with interstitial exudation, mononuclear and lymphocytic inflammatory cell infiltration (CD4+ve T cells) were observed. Focal bleedings with congestion and edema of the microvasculature were noticed. In addition, multinucleated giant cells were seen.

Sharon *et al.* (12) reported postmortem lung cases in ten covid19 patients and found that they suffer from the two stages of diffuse alveolar damage including the exudative and proliferative phases. Other cases developed minute respiratory thromboembolism.

Buja *et al.*(13) studied the pathological changes in covid 19 lung autopsies and they reported interstitial pneumonia and hemorrhage, diffuse alveolar damage, small vasculature thrombosis and thromboembolism. Hanley B *et al.* (14) reported ten cases of lung autopsy in covid 19 patients and they noticed vasculature thrombosis with inflammatory cell infiltration and diffuse alveolar damage.

Ackerman *et al.* (15) studied the pathological changes in lung autopsy of covid 19 patients and they reported T-lymphocytic infiltration, diffuse alveolar damage, and formation of microthrombi in the alveolar microvasculature with severe injury of vascular endothelium. They also recorded that the pathological findings are getting worse with increasing length of admission in COVID-19 patients.

Diffuse alveolar damage is the most prominent histological feature that has been noticed in postmortem coronavirus infected patients(16). This damage is divided into two stages the first one is the exudate formation stage which is characterized by excessive accumulation of macrophages and plasma cells and intra-alveolar edema. The second stage is named as the fibrous stage which is characterized by fibrous tissue formation (17). Many cases of diffuse alveolar damage recover slowly, but some cases will advance to interstitial fibrosis (18).

El Soukary *et al.* (19) examined lung autopsies of 32 patients that have died of coronavirus and they found that all of them suffer from diffuse alveolar damage either stage one or two with pneumonia and neutrophil accumulation within the alveoli.

Merdjiet *et al.* (20) assessed the postmortem lungs of covid19 patients who admitted to the respiratory care unit and they found that most of the examined sections showed diffuse alveolar damage with both exudative and fibrotic changes, excessive inflammatory cellular infiltration mainly lymphocytes in early stage and then plasma cell infiltration. In addition to thrombus formation of small sized pulmonary vessels and pulmonary embolism.

Agnillo *et al.* (21) 2021 studied the lung autopsies from eighteen covid 19 patients and they stated that corona virus can stimulate the immunity of the body leading to severe complications like disseminated intravascular coagulopathy and minute vascular thrombus formation with

Irreversible lung damage especially fibrosis of lung tissue.

Conclusion

This study concluded that the principal cause of death in covid 19 patients is the acute respiratory distress syndrome which showed a histological picture of diffuse alveolar damage, microvascular damage and pulmonary thromboembolism.

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