

Case Report

Clinicopathologic Findings from Autopsy of the first autopsy done for Patient with COVID-19, Sylhet

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Introduction

The China Health Authority alerted the World Health Organization (WHO) on December 31 2019, to several cases of pneumonia of unknown aetiology in Wuhan City in Hubei Province in central China. Since December 8, 2019, these cases had been reported, worked at or lived around the local Huanan Seafood Market.¹

Radiology finding may vary with patients age, disease progression, immunity status, comorbidity, and initial medical intervention. In a study describing 41 of the initial cases of 2019-nCoV infection, all 41 patients had pneumonia with abnormal findings on chest computed tomography (CT-scan). Abnormalities on chest CT-scan were also seen in another study of 6 cases, in which all of them showed multifocal patchy ground-glass opacities notably nearby the peripheral sections of the lungs.²

Complete autopsy studies were almost nonexistent in the initial phases of the outbreak; reasonably so, due to concerns related to infectivity, transmission rates, and biosafety. The few reports initially published were limited to postmortem biopsies in COVID-19-positive patients or from lobectomy specimens initially resected for lung adenocarcinoma, but patients were later found to be COVID-19-positive (7). Pathologic features of exudative and proliferative phases of diffuse alveolar damage (DAD) were noted in these initial reports and overlapping features with SARS were also noted. Later complete autopsies performed in United States further supported the presence of DAD.³

The predominant pattern of lung lesions in COVID-19 patients is DAD, as described for the other two coronavirus that infect humans, SARS-CoV and MERS-CoV. Hyaline membrane formation and pneumocyte

atypical hyperplasia are frequently found. The main relevant finding is the presence of platelet-fibrin thrombi in small arterial vessels; this important observation fits into the clinical context of coagulopathy which dominates in these patients and which is one of the main targets of therapy.⁴

The macroscopic features of COVID-19 are likely to be in the chest and may include pleurisy, pericarditis, lung consolidation and pulmonary oedema. Lung weight may be increased above normal. It should be noted a secondary infection may be superimposed on the viral infection that can lead to purulent inflammation more typical of bacterial infection.⁵

The pulmonary histologic characteristics of COVID-19 resembled those observed in diseases caused by other *Betacoronavirus* infections such as severe acute respiratory syndrome⁴ and Middle East respiratory syndrome.⁶

Histopathology of the lungs showed diffuse alveolar damage, consistent with early acute respiratory distress syndrome in 8 cases. Predominant findings were hyaline membranes, activated pneumocytes, microvascular thromboemboli, capillary congestion, and protein-enriched interstitial edema. As described by Wang and colleagues, a moderate degree of inflammatory infiltrates concurred with clinically described leukopenia in patients with COVID-19 and predominant infiltration of lymphocytes fit the picture of a viral pathogenesis.⁷

General rules for forensic pathology examination

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is entitled to perform medico legal autopsies in case of unnatural deaths including suicidal, homicidal, accidental and sudden unexpected natural or suspicious deaths to find out the relevant information along with manner, nature and causes of death. As per prerequisite for autopsy the police authority have to prepare inquest report, chalan after proper identification and receiving details history before death of a person to perform medico legal autopsy. Other prerequisites i.e. mortuary facilities, proper illumination and technicians support, spot examination and relevant other examination facilities e.g. histopathological, microbiological, chemical analysis along with DNA screening and profiling etc. In case of death due to epidemic or pandemic and contagious cases, personal protection system along with mortuary safety system should be ensured before receiving and dispatching the dead body which was maintained in this particular autopsy as a mandatory rule. Other prerequisites e.g. death certificate, hospital record along with treatment history were also obtained for properly performing autopsy. No unauthorized persons were allowed to attend any autopsy which was also maintained.

Categorizing protection strategies

As it was a Covid-19 positive case before death and diagnosis was done by clinical features along with RT-PCR test which was positive for the corpse, the autopsy was performed by ensuring Biosafety Level 3 (BSL-3) protection according to the category of the case.

Cadaver examiner/ Forensic pathologist

A medical board conducted the whole autopsy procedure under supervision of a senior forensic pathologist along with mortuary technicians to ensure proper autopsy and safety measures. As there is no vaccine yet available for Covid-19 cases, immunization is not possible to ensure the safety measure for person involved in the autopsy procedure. Protection requirements were PPE (Personal Protective Equipment) i.e. protective suit, grade N95 protective mask, goggles, protective shoe covers and double layer latex gloves were worn by every individual involved in the autopsy

Environmental disinfection

Workplace

Spraying of the disinfectant was done at the mortuary and the surroundings by a 500 mg/L chlorine-containing disinfectant on the floors, walls and frequently used objects including the autopsy table. After completion of the autopsy, disinfectant of higher concentration (1000 mg/L) were also sprayed along with more higher concentration (2000 mg/L) chlorine containing disinfectant at the dissecting table and surrounding areas. It is a fact that the virus becomes inactivated after

4-6 hours of death of Covid-19 positive deceased body till than all precautions were maintained to avoid any suspicion because the person involved in performing the autopsy might be asymptomatic carriers or patients of Covid-19.

Result

A male body of about 54 years with comorbid condition (CVD, HTN) along with COVID-19 Positive disease was brought to the Department of Forensic Medicine, Sylhet MAG Osmani Medical College on 13/05/2020 who died on 10/05/2020.

An autopsy was conducted 72 hours after death, with the exception of bone marrow.

Macroscopically, the trachea and bronchi exhibited congested but neither redness nor erosion; however, the lungs (left, 700 g; right, 750 g) were partially dark red, consolidated, and airless. On palpation the lung parenchyma were felt with crepitation due to pulmonary edema and air retention. During cut section blood stained/serosanguineous froth was coming out specially from the middle and lower part of both the lungs. Larynx, trachea, bronchus were found with accumulation with serosanguineous froth.

Both the right and left pleura and the pericardium were congested. The cut surface was slightly sticky. Specifically, both pleurae were slightly thickened, with pleural effusions of about 30 ml in each pleural cavity. The heart (450 g) showed right ventricular dilatation, with slight cardiac effusion. Histologic analysis revealed that the lungs exhibited features of both exudative and organizing diffuse alveolar damage (DAD). Liver, spleen, kidney and urinary bladder all found congested.

The lung tissues in the exudative phase of DAD showed prominent hyaline membranes, and those in the organizing phase of DAD showed desquamation, squamous metaplasia of the epithelial cells, organizing hyaline membranes, and inflammatory cell infiltration with prominent plasma cells in the alveolar septa. We observed intra-alveolar hemorrhage, vascular congestion. In addition, we detected hemophagocytosis in the lungs, spleen, and lymph nodes. The glomeruli of both kidneys were marked by microthrombi, suggesting early signs of disseminated intravascular coagulation. We observed no notable changes in the other organs.

Conclusion

In This case, who did not receive invasive ventilation, disseminated diffuse alveolar damage at different stages was the major histologic finding. Diffuse alveolar damage was detectable in all lobes but appeared unevenly distributed with pronounced manifestation in middle and lower lung fields.

References

1. Lu H., Stratton C.W., Tang Y.W. Outbreak of pneumonia of unknown etiology in Wuhan China: the mystery and the miracle. *J Med Virol.* 2020
2. Harapan H, et al. Coronavirus disease 2019 (COVID 19): A literature review, *J Infect Public Health.* 2020 May; 13(5): 667–673
3. Deshpande C. Thromboembolic Findings in COVID-19 Autopsies: Pulmonary Thrombosis or Embolism? Available from: <https://www.acpjournals.org/doi/10.7326/M20-3255>
4. Luca Carsana et al. Pulmonary post-mortem findings in a large series of COVID-19 cases from Northern Italy. Available from: doi: <https://doi.org/10.1101/2020.04.19.20054262>
5. Osborn M , Lucas S , Stewart R , et al . Autopsy practice relating to possible cases of COVID-19 (2019-nCov, novel coronavirus from China 2019/2020) secondary autopsy practice relating to possible cases of COVID-19 (2019-nCov, novel coronavirus from China 2019/2020), 2020. Available: <https://www.rcpath.org/uploads/assets/d5e28baf-5789-4b0f-acecfe370eee6223/fe8fa85a-f004-4a0c-81ee4b2b9cd12cbf/Briefing-on-COVID-19-autopsy-Feb-2020.pdf>
6. Van den Brand JM, Smits SL, Haagmans BL. Pathogenesis of Middle East respiratory syndrome coronavirus. *J Pathol.* 2015;235(2):175-184. doi:10.1002/path.4458
7. Wichmann D. Autopsy Findings and Venous Thromboembolism in Patients With COVID-19: A Prospective Cohort study.