

## Case Report

# Chest Non-contrast ct-scan findings and follow up a patient suspected covid-19 infection

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### Abstract

**Background** Covid-19 is an infection caused by SARS-CoV-2. Chest X-Ray (CXR) examination doesn't show the radiographic characteristic of Covid-19 infection. Thorax CT-Scan is the gold standard imaging for pneumonia Covid-19 infection.

**Aim** The purpose of this report is to describe a case of bronchopneumonia in a male patient aged 48 years old at Bethesda Hospital Yogyakarta during the Covid-19 pandemic.

**Case Description** A 48 years old male patient came to the Bethesda Hospital in Yogyakarta with a complaint of fever 1 week before being hospitalized. The patient also complained of cough, sore throat, rhinorrhea, shortness of breath, malaise, and decreased appetite. The rapid test result shows SARS-CoV2 IgM and IgG (+), PCR swab Covid-19 results (+). Bronchopneumonia was concluded by CXR examination and chest non-contrast CT-Scan showed Covid-19 infection imaging characteristics. Later on, the patient showed clinical and radiological improvement.

**Conclusion** Covid-19 is an infection caused by the SARS-CoV-2. Common symptoms are fever, cough, sore throat, shortness of breath, and malaise. CXR examinations on patients with Covid-19 infection show images of pneumonia, in this case, bronchopneumonia was concluded. CT-scan shows characteristic imaging of Covid-19 infection can support the decision on regular ward admission versus ICU and for follow-up in regular ward admission.

**Keywords:** Bronchopneumonia, Chest X-ray, Covid-19, CT-scan.

## INTRODUCTION

Covid-19 is an infectious disease caused by the SARS-CoV-2. On December 31<sup>st</sup>, 2019, the WHO Representative office in China was informed about a case of pneumonia of unknown etiology from Wuhan, China.<sup>1</sup> This new virus is highly contagious and easily spread globally.<sup>2</sup> This virus is transmitted through close contact with infected patients, especially through respiratory droplets produced by sneezing, coughing, and touching contaminated objects. SARS-Co-2 particularly infects the epithelial respiratory tract in alveoli. The cytopathic effect and the ability to beat the immune system determine the severity of infection. The common symptoms are fever, cough, sore throat, shortness of breath, anorexia, and malaise. The disease is often mild in some people but can progress to pneumonia, acute respiratory distress syndrome (ARDS), and multiorgan dysfunction. The radiological pictures that often appear in Covid-19 patients resemble that of pneumonia.<sup>3</sup> In this report, we will discuss the CXR examination with bronchopneumonia conclusion in suspected Covid-19 infection patient and confirmed later Covid-19 by PCR test. The CT-scan examination was done to make admission decisions and to follow up on the disease.

## CASE DESCRIPTION

### Patient information

On January 14<sup>th</sup>, 2021, a 48 years old male patient came to the Bethesda Hospital Yogyakarta clinic complaining of fever one week before being hospitalized. The patient also complained of cough, sore throat, rhinorrhea, shortness of breath, malaise, and decreased appetite.

### Clinical finding

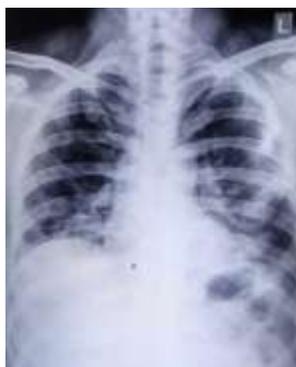
The patient's vital signs show blood pressure of 120/80 mmHg, pulse rate of 84x/minute, respiration rate of 20x/minute, temperature of 37.5°C, and oxygen saturation of 95%. Head to toe examination, no signs of anemia and jaundice. Chest examination findings were vesicular breath sounds +/+, rhonchi -/-, wheezing -/-.

### Diagnosis assessment

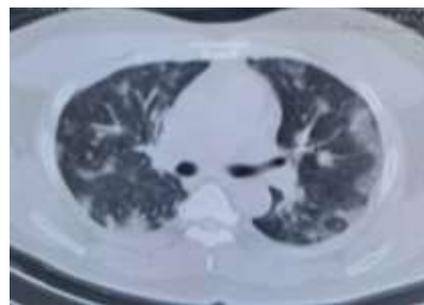
The result of the antibody rapid test showed IgM and IgG SARS-CoV-2 were reactive. The patient underwent a follow-up examination of CXR and chest non-contrast CT scan, then the patient was planned to do a swab PCR test. The patient was then admitted to a special isolation room for Covid-19.

The chest X-ray examination showed an increase in coarse bronchovascular and the presence of

peribronchial and paracardial consolidation (Figure 1). Chest CT-scan examination revealed an increase in coarse bronchovascular markings, inhomogeneous consolidation, and a ground glass opacity (GGO) in both lung fields, especially on paracardial with a lateral posterior peripheral distribution (Figure 2). The results of chest X-ray and chest CT suggest bronchopneumonia. While the patient's swab PCR test was found to be positive for Covid-19.

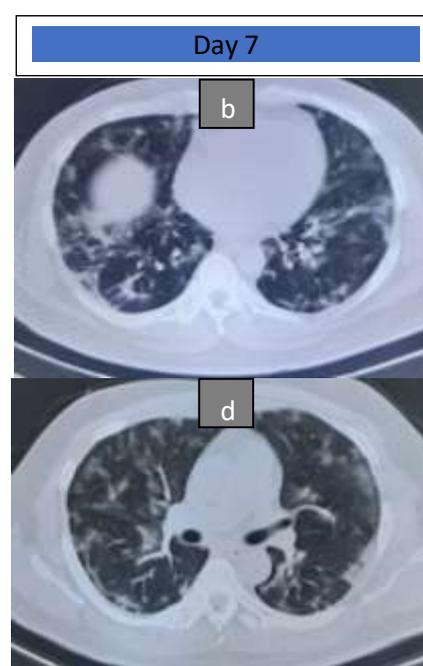
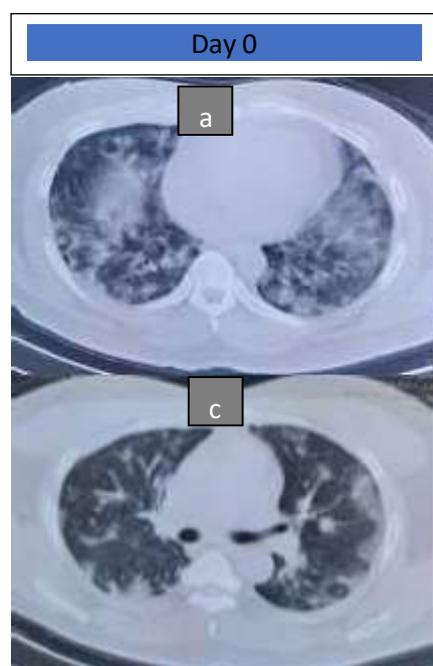


**Figure 1.** Chest X-ray of Covid-19 patient at the time of admission showed the patient had bronchopneumonia, consolidation was seen in the peribronchial paracardial paracardium with GroundGlass Opacity (GGO) and an increase in coarse brocovascular markings.



**Figure 2.** Non-contrast CT-scan axial section of a Covid-19 patient at the time of admission showed the patient had bronchopneumonia, an increase in coarse bronchovascular markings, inhomogeneous consolidation, and a ground glass opacity (GGO) in both lung fields, especially paracardial with a peripheral distribution latero-posterior

The patient was treated with antiviral, multivitamins, and symptomatic therapy, and later on patient showed clinical and radiological improvement. The image of chest non-contrast CT-scan taken 7 days after treatment, was then compared with chest non-contrast CT-scan. The density of the old lesions reduced and showed improvement (Figure 3).



**Figure 3.** Axial section non-contrast CT scan in Covid-19 patients at admission (a,c) compared to non-contrast CT scan (b,d) at seven days after treatment the density of the old lesions decreased and showed improvement

## DISCUSSION

The reported patient showed early COVID-19 phase and mild-moderate pneumonia according to the article review written by Susilo et al. (2020).<sup>9</sup> CXR image shows initially bronchopneumonia impression, on Chest non-contrast CT-scan examination revealed bronchopneumonia characteristic to COVID-19 infection. Diagnosis of COVID-19 is made by RT-

PCR swab examination. A chest CT scan is recommended in suspected COVID-19 infection with mild and moderate symptoms cases, both can support the decision on regular ward admission versus ICU and for follow-up in regular ward admission.

According to the Radiology Society of North America (RSNA), the CXR image of covid-19 infection is

divided into four categories: Typical, Atypical, Intermediate, and Negative. The typical type is the most pneumonia CXR image type. Pleural effusion and cardiomegaly images were also found in the CXR examination.<sup>4</sup> CXR examination shows a 6% false-positive rate and 83.3 to 96% true positive rate on COVID-19 cases.<sup>3</sup> CXR has a low diagnostic value in the early stages, whereas with a CT scan the hallmarks of the disease can be found even before the onset of symptoms.<sup>4</sup>

Pathogenesis of pneumonia induced by Covid-19 infection divides into two phases: early and late phases. In the early phase, replication of the virus caused direct tissue destruction and followed by the late phase when the infected host cells trigger immune responses. Increasing vascular permeability causes pulmonary oedema in Covid-19 patients.<sup>10</sup> The major histopathologic finding in COVID-19 pneumonia is diffuse alveolar damage, characterized by inflammatory infiltrates and intra-alveolar oedema and exudates. GGO on chest CT-scan represents an early exudative phase of covid-19 infection, progressing to consolidation with intra-alveolar organization, fibroblastic proliferation, and alveolar collapse. Chest CT-scan within the first 5 days of symptom onset typically demonstrates a GGO-predominant pattern, followed by increasing consolidative changes for up to 14 days. The consolidation represents the peak stage of COVID-19 pneumonia and is mostly found in critically ill patients, who experience respiratory failure, intensive care unit admission, or death compared with those with an uncomplicated hospital course.<sup>11</sup>

The CT scan image shows gradual changes according to the phase of covid-19 infection. The CT scan image of the asymptomatic patient tends to show unilateral, multifocal, GGO predominant. One week after the onset of the symptoms, a CT-scan image shows bilateral diffuse lesion, GGO predominant, pleural effusion 5%, lymphadenopathy 10%. Two weeks after the onset of the symptoms, a CT-scan image shows GGO predominant with minimal consolidation. Three weeks after the onset of symptoms CT scan image shows GGO and reticular pattern predominant, which can be accompanied by bronchiectasis, pleural thickening, pleural effusion, and lymphadenopathy.<sup>9</sup> The CT scan findings in initial COVID-19 cases are bilateral, multilobular ground glass opacification (GGO) lesions with a peripheral or posterior distribution, mainly in the lower lobes and less often in the middle lobes. It is important to note that there are many patterns of CT-scans findings for COVID-19 that overlap with other viral cases of pneumonia.

A study conducted at Bali Mandara Hospital in 2021, shows chest X-Ray (CXR) images of Covid-19 patients mainly portray the characteristic of GGO type lung opacity, periphery distribution on both lungs.<sup>4</sup> CT-scan examinations on probable COVID-19 cases, showed GGO dan crazy paving pattern.<sup>6</sup> Most CT-scan image found in Covid-19 pneumonia

is typical type, including GGO, peripheral and subpleural distribution, and multiple lobules, particularly lower lobule. GGO image mixed with consolidation area and associated with superimposed intralobular reticulations, shape crazy paving pattern.<sup>8</sup> Consolidation, central and peripheral lesion distribution, and on all the lung lobules are more often found in CT scan examination of severe-critical than moderate Covid-19 infection. Total severity score and lesion volume increase according to the increased severity of the patient clinical condition.<sup>7</sup> CT-derived quantitative lung measures may be useful for clinical risk stratification in patients with COVID-19.<sup>11</sup> According to the discussion above, the patient had a mild to moderate clinical presentation and the clinical condition was confirmed with a typical early phase of imaging of chest non-contrast CT scan. The patient had a good prognosis. The good prognosis was confirmed by better chest non-contrast CT-scan images one week later and the patient's rapid clinical improvement with appropriate treatment.

## CONCLUSION

COVID-19 is an infectious disease caused by the SARS-CoV-2. Common symptoms that often appear are fever, cough, sore throat, shortness of breath, malaise, and anorexia. Patients with Covid-19 infection often show radiological features resembling pneumonia, but may also present with bronchopneumonia. MSCT shows characteristics of lung imaging of Covid-19 infection and is used fully for follow up therapy and prognosis measurement.

## CONFLICT OF INTEREST AND FUNDING RESOURCE

The authors stated no conflict of interest.

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