

A Case of COVID-19 in an Elderly Patient Evaluated by Axial CT Presented with Severe Signs and Symptoms: A Correlation of Severe Hypoxia with Remaining Lung Tissue

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ABSTRACT

Identification of computerized tomography (CT) characteristics of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is essential to early diagnosis and treatment of patients and stage the disease according to the appearance of the lung field involvement. The CT chest images of a patient with severe SARS-CoV-2 were collected to assess the CT findings and characteristics. Patchy ground-glass opacities (GGO) were found in some upper lung zones with right upper lung interlobar septal thickening and formation of consolidation throughout the middle and lower zones of the lungs of Crazy Paving pattern type. The remaining lung tissue is directly proportional to the measured oxygen concentration in a severe symptomatic COVID-19 case. These findings are beneficial for early detection and assessment of the severity of SARS-CoV-2.

Key words: COVID-19, CT chest, Crazy paving, Ground glass appearance

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INTRODUCTION

The 2019 novel coronavirus disease (COVID-19) is considered as severe acute infection caused by a virus called severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). It is a non-segmented and enveloped positive-sense RNA virus included in the family of the beta-Coronaviridae [1]. The SARS-CoV-2 virus has been proved to cause severe pneumonia and acute respiratory distress syndrome (ARDS) with a high considerable mortality rate [2]. According to the World Health Organization (WHO) reports, there are 70 million cumulative diagnosed cases among which 1.6 million demised of COVID-19 since the start of the disease, and the disease is still increasing rapidly [3]. We presented this case of an elderly male presenting with fever, cough, shortness of breath, and sore throat, who was confirmed positive of SARS-CoV-2 on PCR test.

Imaging characteristics of COVID-19 are evolving. Therefore, awareness of these imaging characteristics is

essential to provide a contribution in the diagnosis of the disease. Computerized tomography scanning (CT) has been considered a rapid, sensitive, and reliable method to assess COVID-19 infections. It plays an active role in the detection and evaluation of SARS-CoV-2. CT achieved a sensitivity of 98% and 97% for the diagnosis of SARS-CoV-2 [4,5]. It was proposed to use the CT chest as a primary imaging tool in endemic regions for detecting SARS-CoV-2 [6]. Herein, we reported the features of CT chest characters and to correlate the percentage of remaining healthy lung size on CT with oxygen saturation in a patient who suffered severe signs of Covid-19.

CASE REPORT

A 78-years-old male patient was brought to the Al-Saha diagnostic clinic in Khartoum with a recent medical history of fever, cough, headache, and sore throat with thirteen-day duration. The patient is not known to be diabetic or hypertensive but at lower limits of BMI. The patient diagnosed as a case of Malaria and has been given the injectable antimalarial drug in a rural area. A few days later, when there was no regression of signs and symptoms, he was tested for Enterica and was given treatment accordingly. However, signs and symptoms were

not relieved and started to complain of getting worse concerning his breath. Before completing the full course of treatment, he was investigated with the PCR test, and the result was positive of COVID-19. He was then taken to do CT of the chest. The oxygen concentration was only 35% at the time of admission.

The patient was brought to one of the capital's hospital after a nine days period of progressive chest infection, fever, headache, and mealigea. He was missed diagnose for malaria and chest infection and treated accordingly in his village. His condition showed no improvement and his chest infection is getting progressively worse. When he was imaged he was advised by the representatives of COVID-19 emergency doctors to be admitted and get intubated.

The patient was examined using CT in Khartoum city after 13 days of the onset of the disease. The CT images showed typical Covid-19 ground glass opacity (GGO), severe Crazy Paving patterns [7]. Which involved almost 60% to 70% of the lung tissue (30% remaining lung tissue), more evident in both lungs (Figure 1) as assessed visually by the Radiologists. The percentage of lung involvement was estimated visually depending on the abnormality volumes compared to the total lung volume. Accordingly, the remaining healthy volume of the lung was estimated as one-third compared to the total volume [8,9]. Interestingly, the percentage of oxygen concentration is consistent and proportional to the remaining tissue of the lung (30%). There were small areas of the upper lung of GGO affecting the upper part of both lungs more on the right side, and patchy consolidation forming crazy-paving involving the pig portions of both lungs with halo-sign on the right lung (Figure 2). Noticeably, the trachea in this patient was fully distended with air, maybe describing the exertion effort made to grasp oxygen. There was no pleural effusion detected. Directly after the CT examination, the patient was referred to the ICU with severe hypoxia; the oxygen concentration was only 35%. He died after a long journey of agony after 3 hours of admission.

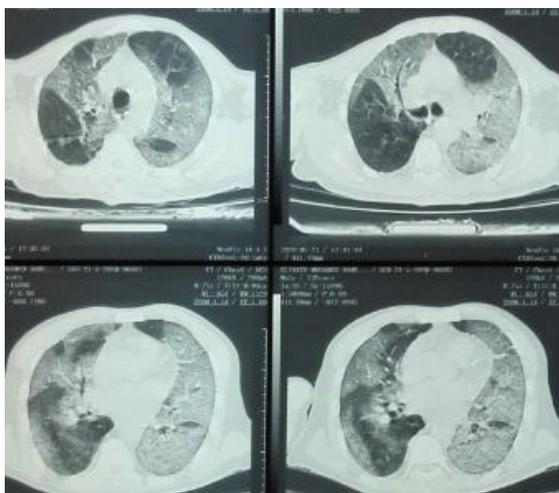


Figure 1: Axial CT images shows remaining one-third of healthy lung tissue with consolidation and crazy paving sign.

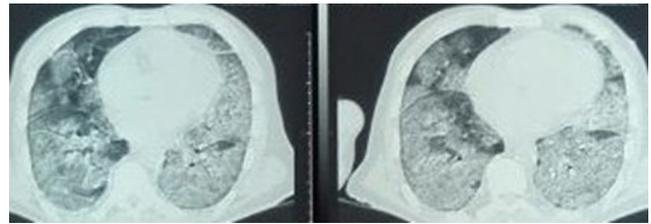


Figure 2: axial CT images show diffuse consolidation affecting the both lungs with Halo sign noted at the left lung.

DISCUSSION

Despite the diagnosis of COVID-19 based on pneumonia symptoms such as fever, dry cough, myalgia, dyspnea, and fatigue, chest imaging plays an effective role in both assessment of extent of the disease and follow-up [10]. Chest imaging of the infected lungs is more applicable with COVID-19 [11]. It is considered the first-line imaging modality in severe cases and is useful for monitoring progressive changes during development of the disease and treatment. Therefore, CT is considered an efficient clinical diagnostic tool for symptomatic patients suspected with COVID-19 [12].

The sensitivity of CT to acquired respiratory syndrome is high and the specificity of COVID-19 findings as GGO starting peripherally with progressive development of consolidations of Crazy Paving pattern. These findings are the landmark for diagnosing of Covid-19 especially in patients who are getting worsening signs and symptoms as shown in this case study.

In this case, CT images showed typical COVID-19; GGO with severe Crazy Paving patterns which has involved almost 60% to 70% of the lung tissue more obvious in the left side. It was observed that the remaining uninvolved lung is approximately one third of the right lung (Figure 1) which is consistent with the measured oxygen concentration (35%). Thus, a small remaining lung tissue is correlated with lesser oxygen concentration. Wang et al found correlation between severity of thorax infection and blood oxygen saturation [13]. Therefore, the remaining lung tissue is approximately directly proportional to the oxygen concentration.

There was interlobar thickening. These findings are similar to those cases reported by Lei [14,15] and Pan et al., and other previous studies [16-18]. It was reported that in severe cases, lung consolidation appears as "white lung", with rare pleural effusion and enlargement of mediastinal lymph nodes [19,20]. In this case, there was no mediastinal lymphadenopathy and pleural effusion observed in the mediastinal window. The cardiac findings were unremarkable. These features made the Radiologists acquiring more experience in diagnosing COVID-19, especially in patients who are progressively getting worse.

The CT mediastinal window showed unremarkable cardiac and pig vessels. The above findings of the Crazy Paving, the GGO, and interlobar thickening without

presentation of pleural effusion will contribute to enriching the Radiologists knowledge of the degree of severity and the patterns of Covid-19. The absence of the pleural effusion even at this high degree of severity of the disease give us more experience in diagnosing Covid-19 especially in patients who are progressively getting worse.

The CT characteristics are crucial for diagnosis and monitoring the follow-up of patients with COVID-19. Therefore, CT chest might be used for screening people who were suspected of the disease.

LIMITATION

The case of this patient was detected too late after the disease progressed. The patient has been missed diagnosed for other diseases endemic in the area of center of Sudan, like malaria. There was no radiological examination is done for this patient during the onset and the moderate stages of this acute attack, and no imaging record is available. The awareness of the signs and symptoms of Covid-19 is very low amongst the medical staff in the region at the early times of the pandemic, so the patient did not receive oxygen before reaching Khartoum capital which is about 90km away.

CONCLUSION

Thoracic CT imaging plays a useful role in the evaluation of COVID-19. This case of COVID-19 showed areas of GGAs in upper zones, distended trachea, and Crazy Paving consolidation after 13 days of the infection. The remaining unaffected lung tissue is directly proportional to the measured oxygen concentration. These findings are useful for early detection and assessment of the severity of COVID-19 pneumonia. It is recommended to do further studies to correlate normal residual lung volume with oxygen concentration.

REFERENCES

- Alshami A, Douedi S, Varon J et al. Coronavirus in the arena: One more time. *Current Respir Med Rev* 2020; 16:3-4.
- Yang X, Yu Y, Xu J, et al. Clinical course and outcomes of critically ill patients with sars-cov-2 pneumonia in Wuhan, China. A single centered, retrospective, observational study. *Lancet Respir Med* 2020; 8:475-481.
- <https://www.who.int/emergencies/diseases/novel-coronavirus-2019>
- Xu B, Xing Y, Peng J, Chest CT for detecting covid-19. A systematic review and meta-analysis of diagnostic accuracy. *Eur Radiol* 2020; 30:5720-5727.
- Fang Y, Zhang H, Xie J, et al. Sensitivity of chest CT for covid-19.comparison to RT-PCR. *Radiology* 2020; 296:115-117.
- Hope MD, Raptis CA, Henry TS et al. Chest computed tomography for detection of coronavirus disease 2019 (COVID-19). Don't rush the science. *Ann Intern Med* 2020; 173:147-148.
- Ufuk F, Savaş R. Chest CT features of the novel coronavirus disease (covid-19). *Turkish J Medical Sci* 2020; 50:664-678.
- Ma C, Wang XL, Xie DM, et al. Dynamic evaluation of lung involvement during coronavirus disease-2019 (COVID-19) with quantitative lung CT. *Emergency Radiol* 2020; 671-678.
- Zhong L, Zhang S, Wang J, et al. Analysis of chest CT results of coronavirus disease 2019 (covid-19) patients at first follow-up. *Canadian Respir J* 2020; 2020.
- Zhao W, Zhong Z, Xie X, et al. Relation between chest CT findings and clinical conditions of coronavirus disease (COVID-19) pneumonia: a multicenter study. *Am J Roentgenol* 2020; 214:1072-1073.
- Hefeda MM. CT chest findings in patients infected with covid-19.Review of literature. *Egypt J Radiol and Nucl Med* 202; 51:1-5.
- bgs.satcm.gov.cn/zhengcewenjian/2020-02-06/12847.html
- Wang K, Kang S, Tian R, et al. Imaging manifestations and diagnostic value of chest CT of coronavirus disease 2019 (COVID-19) in the Xiaogan area. *Clin Radiol* 2020; 75:341-347.
- Lei J, Li J, Li X, et al. CT imaging of the 2019 novel coronavirus (2019-ncov) pneumonia. *Radiol* 2020; 295:318.
- Pan Y, Guan H, Zhou S, et al.L. Initial ct findings and temporal changes in patients with the novel coronavirus pneumonia (2019-nCoV): A study of 63 patients in Wuhan, China. *Eur Radiol* 2020; 30:3306-3309.
- Sendi AA, Saggat DF, Alzahrani SJ. et al. Incidental typical covid-19 appearance on the lung bases, visualized at abdominal CT for a patient that presented with abdominal pain and nausea. *Radiol Case Reports* 2020; 15:1238-1241.
- Duan Y, Zhu Y, Tang L, et al. CT features of novel coronavirus pneumonia (COVID-19) in children. *Eur Radiol* 2020; 30: 4427-433.
- Shatri J, Tafilaj L, Turkaj A, et al. The role of chest computed tomography in asymptomatic patients of positive coronavirus disease 2019: A case and literature review. *J Clin Imaging Sci* 2020; 10:35.
- Lomoro P, Verde F, Zerboni F, et al. COVID-19 pneumonia manifestations at the admission on chest ultrasound, radiographs, and CT: Single-center study and comprehensive radiologic literature review. *Eur J Radiol Open* 2020; 7:100231.

20. Shi H, Han X, Jiang N, et al. Radiological findings from 81 patients with COVID-19 pneumonia in Wuhan, China: A descriptive study. *Lancet Infect Dis* 2020; 20:425-34.