

Case Report



# Right Common Iliac Artery Occlusion in a Patient with Severe COVID-19

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## ABSTRACT

In patients with coronavirus disease 2019 (COVID-19), thromboembolism is a frequently reported complication. However, it is reported that the incidence of arterial occlusion is rare. We experienced a case of 70-year-old male patient who developed a complication of Right common iliac arterial occlusion while treating him for confirmed COVID-19 who did not have any risk factors, such as diabetes or smoking. As in our case, it is necessary to carefully observe whether this complication occurs while treating COVID-19 patients.

**Keywords:** COVID-19; Coronavirus infections; Thromboembolism; Risk factors; Arterial occlusive diseases

## INTRODUCTION

As the global pandemic of coronavirus disease 2019 (COVID-19) progresses and as the number of deaths among confirmed patients increases, there is a growing interest in complications that may affect the treatment outcomes and prognosis. Among them, a number of cardiovascular complications, which can have the greatest impact, have also been reported. Since severe acute respiratory syndrome coronavirus-2 attaches to the angiotensin-converting enzyme (ACE)2 receptor and flows into the cell, it is known that complications occur in the cardiovascular system where the ACE2 receptor is widely distributed [1]. Arterial occlusion, such as stroke and acute coronary

syndrome/myocardial infarction, vary slightly from study to study, but it has been reported to occur in about 3 to 8% of patients admitted to intensive care unit (ICU) for COVID-19 [2-4]. In particular, there have been no reports of arterial occlusion as a complication of COVID-19 infection in Korea. We would like to report a case of right common iliac artery occlusion that occurred during hospitalization and treatment for COVID-19.

## CASE REPORT

A 70-year-old male patient who was diagnosed with COVID-19 on December 26, 2020 and was undergoing

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quarantine treatment had worsened dyspnea symptoms, and he was transferred to our medical institution for intensive care on January 3, 2021. The patient had arrhythmia (the patient could not remember exactly what type of arrhythmia) as an underlying disease; therefore, atenolol was prescribed and taken, but the electrocardiography administered at the hospital showed normal sinus rhythm. He was an ex-smoker who quit smoking 10 years ago and had a smoking history of  $1 \times 50$  pack-years prior to quitting.

When the patient visited the hospital, his vital signs were blood pressure 150/70 mmHg, pulse rate 83 beats/min, respiratory rate 26 breaths/min, body temperature 37.6°C, and O<sub>2</sub> saturation 93%. The results of arterial blood gas analysis of the patient were pH 7.449, pCO<sub>2</sub> 27.9 mmHg, pO<sub>2</sub> 58.7 mmHg, HCO<sub>3</sub> 18.9 mmol/l, and SaO<sub>2</sub> 90.5%. The chest X-ray performed at the time when the patient visited the hospital showed that bilateral pneumonic infiltration had progressed more than 70% in the ground glass opacity pattern. Therefore, physicians immediately started administering dexamethasone 6 mg and remdesivir, and started supplying O<sub>2</sub> with FiO<sub>2</sub> 0.8 mmHg/flow 50% with a high flow nasal cannula. After starting the treatment, the patient's dyspnea symptoms tended to be somewhat relieved.

From January 6, 2021, the patient complained of pain in the right toe, and there was an accompanying color change (Fig. 1). The patient had stable vital signs before the onset of symptoms, and no medication, such as norepinephrine, was prescribed that could affect the blood vessels. At that time, the patient's D-dimer level was 37.62 µg/ml, prothrombin time and international

normalized ratio was 1.34, and activated partial thromboplastin time was 28.7 sec. When the patient visited the hospital, the platelet count was in the normal range of 278,000/mm<sup>3</sup>, but when the patient complained of right toe pain, the platelet count was decreased to 128,000/mm<sup>3</sup>.

When he first complained of pain in his feet, the blood pressure was 180/90 mmHg, the heart rate was 56 beats/min, the respiratory rate was 16/min, and the body temperature was 37.8 degrees. Upon physical examination by the doctors, the dorsal artery pulse was decreased and the femoral pulse was intact. The patient complained of a feeling of cold and tingling in the feet. His feet were accompanied by cyanosis, pain and paresthesia to the touch.

As the patient's O<sub>2</sub> saturation was unstable, angio computed tomography (CT) for evaluation could not be performed immediately, and new oral anticoagulants (Apixaban), cilostazol and vasodilator (Alprostadiil) treatments were started. Nevertheless, the patient's symptoms persisted; hence, lower extremity angio CT was performed on January 11, 2021, and CT findings showed short segmental thrombotic obstruction at the right common iliac artery - external iliac artery with decreased vascularity in the right distal run-offs (Fig. 2).

On January 12, 2021, echocardiography was performed, there was no myocardial injury and cardiac function was intact. However, despite active treatment by the physicians, the patient expired on the 14th day of hospitalization due to the rapid progression of acute respiratory distress syndrome.

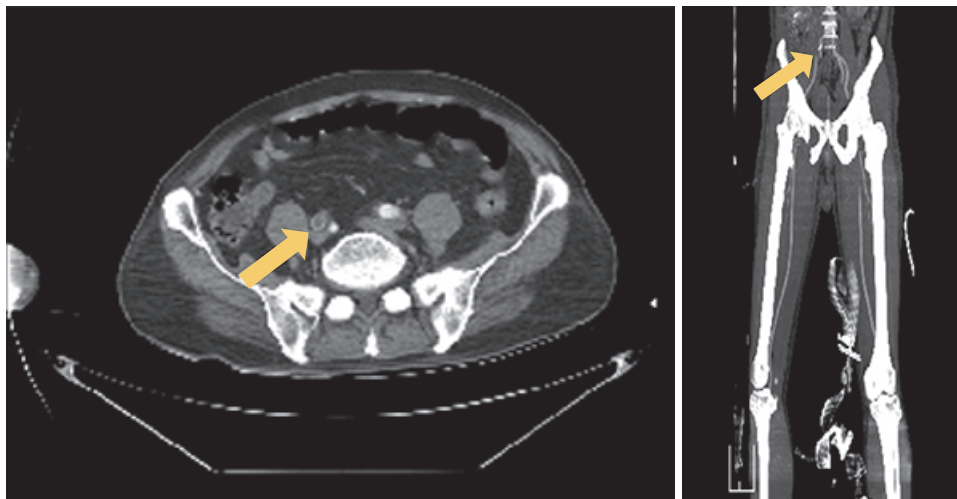


**Figure 1.** Color change pattern of the patient's right foot (A) findings on January 8, 2021 (B) Findings on January 10, 2021

## DISCUSSION

We experienced a case of a patient who developed a complication of arterial occlusion while treating him for confirmed COVID-19. He had no risk factors for developing arterial occlusion other than COVID-19 infection; Diabetes, smoking, or use of vasoconstrictors such as norepinephrine.

The relationship between COVID-19 and thromboembolism has been proved in several reports. In one systematic review, among patients hospitalized and treated for COVID-19 infection, pulmonary thromboembolism was reported to occur in 10.5% of the non-ICU or various



**Figure 2.** Patient's lower extremity CT finding. Yellow arrows indicate lesions with vascular obstruction. Short segmental thrombotic obstruction at right common iliac artery - external iliac artery and decreased vascularity at right distal run-offs.

group and 24.5% of patients admitted to the ICU. Deep vein thrombosis occurred in 7.4% of the non-ICU or various group and 21.2% of the ICU inpatient group [5]. However, the COVID-19 complication associated with arterial thrombosis is relatively rare. In a systematic review paper, approximately 4.4% of COVID-19 patients who admitted in ICU reported arterial thrombosis, and limb artery was the most common site (39.0% of cases with arterial occlusion) [4].

Activation of cytokines such as tumor necrosis factor (TNF)- $\alpha$ , interleukin (IL)-1 $\beta$ , IL-6, and interferon- $\gamma$  are caused by COVID-19 [6]. Among them, it is known that ischemic injury aggravated when the level of TNF  $\alpha$  increases [7]. It has also been reported that an increase in the level of IL-1 $\beta$  expands the range when ischemia occurs [8]. In addition, the secretion of cytokine triggers complement activation, which triggers thrombotic pathophysiology. As a result, macrovascular thrombosis occurs [9]. We hypothesize that excessive secretion of cytokines by COVID-19 eventually caused arterial occlusion.

According to the case report of 7 cases of COVID-19 patients with arterial occlusion reported by Mahine Kashi et al., among the 7 cases, 2 cases occurred in the central artery, such as the aorta, and 5 cases occurred in the peripheral artery of lower extremities. When looking at the laboratory results, the D-dimer level was increased in all cases, and the platelet count was decreased to less than 100,000/mm<sup>3</sup> in only 2 cases. All 7 cases had a history of cardiovascular disease prior to the diagnosis of COVID-19 [10]. According to the results of the analysis

of the New York City health system reported by Seda Bilaloglu et al., the incidence of arterial thrombosis was about 11.1%. The mortality rate of the patients with total thrombotic change was 43.2%, which was found to significantly increase the mortality compared to the COVID-19 patients who did not experience a thrombotic event (21.0%) [11].

The patient had a problem with vital sign instability, and since revascularization was not easy to perform, only medical treatment was given.

When analyzing the study that restored vascularity by the procedure, it was confirmed that the procedure was successful when revascularization was performed but postoperative arterial oxygen pressure was not restored well [12]. Therefore, according to several experts, it is recommended that revascularization be performed only in limited circumstances when arterial occlusion caused by COVID-19 occurs.


In treating COVID-19 patients, evaluation of complications is important in estimating the patient's prognosis. In particular, according to our experience, if arterial occlusion occurs, the patient's mortality risk may increase; thus, adequate care must be taken.


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### Ethics statement

This study was approved by the Institutional Review Board of the Soonchunhyang University hospital, Cheonan and the requirement for informed consent was waived by collecting anonymized data (IRB No. SCHCA 2021-04-020).

### Conflicts of interest

No conflicts of interest.

### Author Contributions

Conceptualization: MHJ. Data curation: JWP. Formal analysis: JWP. Investigation: JWP. Visualization: JWP. Writing - original draft: JWP. Writing - review & editing: MHJ, SNY, JWJ, THJ.

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