CASE REPORT

Case Report: COVID-19 in a female patient who presented with acute lower limb ischemia [version 1; peer review: 2 approved with reservations, 1 not approved]

Ahmed Muhi Fahad¹, Ayam Ali Mohammad², Hasanain A. Al-Khalidi³,
Qusay Jummaa Lazim¹, Fahad Ibrahim Hussein⁴, Ahmed Salih Alshewered⁵

¹Department of Cardiovascular Surgery, Al-Sadder Teaching Hospital, Misan Health Directorate, Ministry of Health/Environment, Misan, 62001, Iraq

²Department of Gynecology, Al-Sadder Teaching Hospital, Misan Health Directorate, Ministry of Health/Environment, Misan, 62001, Iraq

³Department of Neurology, Faculty of Medicine, Kufa University, Kufa, Iraq

⁴Emergency Department, Al-Sadder Teaching Hospital, Misan Health Directorate, Ministry of Health/Environment, Misan, 62001, Iraq

⁵Misan Radiation Oncology Center, Misan Health Directorate, Ministry of Health/Environment, Misan, 62001, Iraq

V1 First published: 28 Jul 2020, 9:778
<https://doi.org/10.12688/f1000research.25319.1>

Latest published: 28 Jul 2020, 9:778
<https://doi.org/10.12688/f1000research.25319.1>

Abstract

Coronavirus disease 2019 (COVID-19) has developed as a pandemic and has caused thousands of deaths worldwide. It may be complicated with arterial or venous thrombosis; however, the literature for concerning these symptoms is limited. Here, we report a rare presentation of COVID-19 infection in a 49-year-old female patient, who presented with acute lower limb ischemia one day before the development of the classic symptoms for COVID-19, such as fever and dyspnea. Clinicians should have a high suspicion and awareness of COVID-19 infection in patients presenting with acute lower limb ischemia, especially during the pandemic period.

Keywords

COVID-19, Acute limb ischemia, Arterial thrombosis, Misan

This article is included in the **Emerging Diseases and Outbreaks** gateway.

This article is included in the **Coronavirus** collection.

Open Peer Review

Approval Status

	1	2	3
version 1
28 Jul 2020	view	view	view

1. **Parminder Kaur** , Saint Joseph University Medical Center, Paterson, USA
2. **Deepak Vedamurthy** , ChristianaCare, Newark, USA
3. **Gabriele Piffaretti**, University of Insubria School of Medicine, Varese, Italy

Any reports and responses or comments on the article can be found at the end of the article.

Corresponding author: Ahmed Salih Alshewered (ahmedalshewerd@gmail.com)

Author roles: **Muhi Fahad A:** Conceptualization, Methodology, Supervision, Writing – Original Draft Preparation; **Mohammad AA:** Resources, Writing – Original Draft Preparation; **Al-Khalidi HA:** Methodology, Resources, Supervision, Writing – Original Draft Preparation; **Lazim QJ:** Data Curation, Methodology, Resources, Writing – Original Draft Preparation; **Hussein FI:** Methodology, Project Administration, Resources, Software; **Alshewered AS:** Writing – Review & Editing

Competing interests: No competing interests were disclosed.

Grant information: The author(s) declared that no grants were involved in supporting this work.

Copyright: © 2020 Muhi Fahad A *et al.* This is an open access article distributed under the terms of the [Creative Commons Attribution License](#), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

How to cite this article: Muhi Fahad A, Mohammad AA, Al-Khalidi HA *et al.* **Case Report: COVID-19 in a female patient who presented with acute lower limb ischemia [version 1; peer review: 2 approved with reservations, 1 not approved]** F1000Research 2020, 9:778 <https://doi.org/10.12688/f1000research.25319.1>

First published: 28 Jul 2020, 9:778 <https://doi.org/10.12688/f1000research.25319.1>

Introduction

Coronavirus disease 2019 (COVID-19) is a global pandemic disease caused by the SARS-COV-2 virus surface spike protein binding to the human angiotensin-converting enzyme 2 (ACE2) receptor, which is expressed in the lung (type 2 alveolar cells), heart, intestinal epithelium, vascular endothelium, and kidneys, providing a mechanism for multi-organ dysfunction. The median incubation period time is 4 to 5 days and 97.5% of patients will exert symptoms within 11.5 days¹.

To the best of our knowledge, there is currently no research available in Iraq showing that ischemia of the lower limb caused by thrombosis is a rare presenting clinical feature of COVID-19. Here, we report a rare presentation of lower limb ischemia in a patient one day before the development of the classic symptoms for COVID-19, such as fever and dyspnea.

Case report

A 49-year-old female patient admitted to the emergency unit with severe agonizing left lower limb pain of one-day duration. No drug, medical, surgical, and smoking history was reported, but the patient did report contact with COVID-19 patients. On examination, the patient was a middle-aged woman, who seemed to be in discomfort. The left leg was cyanosed and discolored up-to the mid-leg, cold, with no detected dorsalis pedis or posterior tibial artery pulsations. There was popliteal artery pulsation, and no detected sensation in the whole left foot and distal third of leg without movement (Figure 1).

Neurological, cardiac, abdominal, and locomotor system examinations were normal with mild crackles in the lung bases. Blood pressure on admission was 130/70 mmHg, heart rate was 123 beats/minute and the patient had a regular body temperature of 37.3°C. The patient's respiratory rate was 18 breaths/minute and SPO₂ was 75% on room oxygen. The patient underwent a blood test, electrocardiogram (ECG),

Doppler study for lower limb arterial examination, and chest radiograph. The blood test results showed hemoglobin of 10.2 g/dl (normal range adult females, 12–16 g/dl), white blood cell count of 17200/ul (normal range, 4000–10000/ul), platelets of 847000/ul (normal range, 165000–415000/ul), lymphocytes of 2800/ul (normal range, 800–2600/ul), blood urea of 8 mg/dl (normal range, 15–45 mg/dl) and D-dimer of 2 (normal range, <0.5). Other investigations such as prothrombin time (PT), activated partial thromboplastin time (aPTT), international normalised ratio (INR) and liver enzymes were not available. The Doppler study showed normal flow in the left common femoral artery, superficial femoral artery, popliteal artery, and both proximal thirds of anterior tibial artery (ATA) and posterior tibial artery (PTA) with abrupt interruption of blood flow in the distal two-thirds of ATA and PTA. Chest X-ray showed large bilateral multiple lung shadows (Figure 2), and the ECG showed sinus tachycardia (Figure 3).

The patient was initiated with an anticoagulant – unfractionated heparin (therapeutic dose of 10,000 Units, in 100mL of 5% Dextrose intravenously (IV) every 6 hours) – fluid therapy (5% Dextrose 250 ml IV every 8 hours; 0.9% Sodium Chloride 250ml IV every 8 hours), oxygen therapy, pain killers (paracetamol injection; 1 g (10mg/100mL) IV every 8 hours), and ceftriaxone injection (1 g IV every 12 hours). The patient was then sent for a CT scan of the chest. This showed bilateral multiple opacities of the lung, suggesting a suspicion of COVID-19 infection (Figure 4). Consequently, the patient was sent to a COVID-19 isolation ward, and nasal and throat PCR test for COVID-19 was taken. Three days post-admission, the COVID-19 test returned a positive result.

On the second day post-admission, the patient developed clear dyspnea and tachypnea. Her saturation dropped from

Figure 1. Left leg discoloration and mottling at the time of presentation.

Figure 2. Chest X-ray showing bilateral lung shadow.

Figure 3. Electrocardiogram showing sinus tachycardia.

Figure 4. CT scan of the chest showing bilateral multiple lung opacities with high suspicion of COVID-19 infection.

93% to 60% (normal pulse oximeter readings range from 95–100%, values under 90% are considered low); therefore, the patient was intubated. The left lower limb was non-viable up to the mid-leg, meaning that the patient was a good candidate for amputation. However, the patient was still unstable and unfit for such a surgery. On the fourth day post-admission, the patient developed sudden cardiac arrest due to persistent hypoxia and unfortunately died.

Discussion

In severe cases, COVID-19 infection can develop disseminated intravascular coagulopathy with fulminant activation of coagulation leading to widespread microvascular thrombosis². This may be reflected by high D-dimer, prolongation of PT, aPTT, INR and decreased fibrinogen levels, which are not available in our center³. Our case shows that one should keep in mind that acute limb ischemia may be a clinical feature of COVID-19 infection as an isolated early symptom, in addition to other features, or may develop as a complication of disease during the admission period due to intravascular thrombosis². In our patient, as in many cases of acute lower limb ischemia, the diagnosis was early as it depended on clinical history and examination with Doppler study.

Our case differs from two case reports by Kaur *et al.* In the first, the patient was a 43-year-old man with a history of hypertension and diabetes mellitus, who presented with acute lower limb ischemia and later developed a fever and exertional dyspnea³. The second reported a 71-year-old Hispanic male with a history of diabetes mellitus who presented with fever,

dry cough and exertional dyspnea followed by development of sudden onset severe upper right arm pain diagnosed as intraluminal thrombosis of the axillary artery⁴. Our patient had no comorbidities and presented with acute lower limb ischemia as an early feature to COVID-19 infection before the development of fever or other respiratory features. In addition, our patient did not undergo surgery due to her instability and metabolic derangement, while in the second report by Kaur *et al.*, the patient underwent thromboembolectomy of the axillary artery⁴. In a study by Bellosta *et al.*, revascularization was done in 17 out of 20 patients, but this was successful in 12 patients only². Unfortunately, our patient died due to cardiac arrest by persistent hypoxia.

We present an unusual presentation of COVID-19 infection as acute lower limb ischemia in a female patient without comorbidities. Doctors should have a high suspicion of COVID-19 infection in such a case especially during the pandemic period.

Consent

Written informed consent for the publication of the article and any associated images was obtained from the patient before she died. Permission to publish was also sought from the patient's husband after the patient died.

Data availability

All data underlying the results are available as part of the article and no additional source data are required.

References

1. Clerkin KJ, Fried JA, Raikhelkar J, *et al.*: **COVID-19 and Cardiovascular Disease.** *Circulation.* 2020; **141**(20): 1648–1655.
[PubMed Abstract](#) | [Publisher Full Text](#)
2. Bellosta R, Luzzani L, Natalini G, *et al.*: **Acute limb ischemia in patients with COVID-19 pneumonia.** *J Vasc Surg.* 2020; **S0741-5214(20)31080-6**.
[PubMed Abstract](#) | [Publisher Full Text](#) | [Free Full Text](#)
3. Kaur P, Qaqa F, Ramahi A, *et al.*: **Acute upper limb ischemia in a patient with COVID-19.** *Hematol Oncol Stem Cell Ther.* 2020; **S1658-3876(20)30096-0**.
[PubMed Abstract](#) | [Publisher Full Text](#) | [Free Full Text](#)
4. Kaur P, Posimreddy S, Singh B, *et al.*: **COVID-19 Presenting as Acute Limb Ischaemia.** *Eur J Case Rep Intern Med.* 2020; **7**(6): 001724.
[PubMed Abstract](#) | [Publisher Full Text](#) | [Free Full Text](#)

Open Peer Review

Current Peer Review Status: ? ? X

Version 1

Reviewer Report 26 October 2020

<https://doi.org/10.5256/f1000research.27943.r72267>

© 2020 Piffaretti G. This is an open access peer review report distributed under the terms of the [Creative Commons Attribution License](#), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Gabriele Piffaretti

Department of Medicine and Surgery, ASST Settelaghi University Teaching Hospital, University of Insubria School of Medicine, Varese, Italy

These Authors experienced what we faced on a daily basis during the outbreak of the pandemic in northern Italy. ALI was rapidly acknowledged as one of the potential presenting symptoms of the CV19 infection, a circumstance that soon we understood should have been treated aggressively with extensive surgery and iv heparin.

This is a single case report: I cannot understand why this patient was not treated immediately owing to the diagnosis of ALI. Moreover, we have no further information regarding the relationship of the CV19 viral infection and the ALI event at least in terms of impact on patient's survival.

Is the background of the case's history and progression described in sufficient detail?

Yes

Are enough details provided of any physical examination and diagnostic tests, treatment given and outcomes?

Yes

Is sufficient discussion included of the importance of the findings and their relevance to future understanding of disease processes, diagnosis or treatment?

Partly

Is the case presented with sufficient detail to be useful for other practitioners?

Partly

Competing Interests: No competing interests were disclosed.

I confirm that I have read this submission and believe that I have an appropriate level of

expertise to state that I do not consider it to be of an acceptable scientific standard, for reasons outlined above.

Author Response 20 Nov 2020

Ahmed muhi Fahad, Al-Sadder Teaching Hospital, Misan Health Directorate, Ministry of Health/ Environment, Misan, Iraq

Yes , as we diagnosed the case as ALI and we can not proceed for surgery , because the patient was unstable and unfit for surgery with distal arterial involvement and there is no intraarterial thrombolytic availability in our center with rapid deterioration of her limb . These are the causes behind the choice of conservative treatment

Competing Interests: No competing interests were disclosed.

Reviewer Report 12 August 2020

<https://doi.org/10.5256/f1000research.27943.r68449>

© 2020 Vedamurthy D. This is an open access peer review report distributed under the terms of the [Creative Commons Attribution License](#), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Deepak Vedamurthy

ChristianaCare, Newark, DE, USA

A 49 yr old lady, non-smoker with apparently no significant medical problems presented to emergency room with acute left lower limb ischemia. She was normotensive, tachycardic, and hypoxic but with normal respiratory rate on presentation. She was anemic with leucocytosis (no lymphopenia), normal renal function (? creatinine) and elevated D-dimer. Rest of coagulation panel not available. PCR for COVID-19 positive. CT chest suggestive of COVID-19. On day 2, patient is intubated and day 4, patient dies.

Venous thromboembolism is well described now in COVID 19 and high intensity DVT (deep vein thrombosis) prophylaxis is often recommended but arterial thromboembolism is not that common and effective prophylaxis has not been described. This make this a valuable case report and the authors do a good job of presenting an important and devastating manifestation of this important disease.

Here are some additional areas that if clarified will help readers.

1. Please clarify what is "clear dyspnea" on physical exam.
2. Was there any history of oral contraceptive usage?
3. Was her blood group known? Recent genome wide association studies reveal this may be important

4. What test (? Platform) was employed to confirm SARS-CoV2
5. What was the date of presentation for patient- Was steroid, Plaquenil, tocilizumab or convalescent plasma treatment option offered? This is a disease with rapidly evolving treatment strategies.
6. Did echocardiogram or did CT chest report any concern for LV thrombus.
7. Was CT angiogram lower extremity performed?
8. Was the patient also screened for DVT and Pulmonary embolism?

Is the background of the case's history and progression described in sufficient detail?

Partly

Are enough details provided of any physical examination and diagnostic tests, treatment given and outcomes?

Partly

Is sufficient discussion included of the importance of the findings and their relevance to future understanding of disease processes, diagnosis or treatment?

Yes

Is the case presented with sufficient detail to be useful for other practitioners?

Yes

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: health outcomes research, health care quality and safety, served as judge for clinical vignettes for American College of Physicians and Society of Hospital Medicine.

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard, however I have significant reservations, as outlined above.

Author Response 20 Nov 2020

Ahmed muhi Fahad, Al-Sadder Teaching Hospital, Misan Health Directorate, Ministry of Health/ Environment, Misan, Iraq

- 1- clear dyspnea means obvious shortness of breath
- 2- no history of OCP
- 3- no it is unknown
- 4- RT pCR
- 5- it is same day of admission , no treatment strategy was given before presentation
- 6-no portable echo was available in covid emergency era

7-pt unfit for transfer to CT angio
8- yes we did

Competing Interests: No competing interests were disclosed.

Reviewer Report 10 August 2020

<https://doi.org/10.5256/f1000research.27943.r68297>

© 2020 Kaur P. This is an open access peer review report distributed under the terms of the [Creative Commons Attribution License](#), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Parminder Kaur

Saint Joseph University Medical Center, Paterson, NJ, USA

This is a interesting case report of unusual and life threatening presentation of COVID -19. However, it needs proofreading.

1. title should be rephrased.
2. abstract -- 2 nd line -- needs to be edited -- these concerning symptoms.
3. keywords -- misan-- unclear what is meant by it.
4. Introduction -- SARS-COV-2 -fullform.
5. Introduction -- **first line needs to be edited** --- like can be split into two sentences. first line --Coronavirus disease 2019 (COVID-19) is a global pandemic disease caused by the SARS-COV-2 virus. second line-- SARS-COV-2 virus binds to angiotensin-converting enzyme 2 (ACE2) receptor, which is expressed in the lung (type 2 alveolar cells), heart, intestinal epithelium, vascular endothelium, and kidneys, providing a mechanism for multi-organ dysfunction.
6. change 97.5% of patients will exert symptoms within 11.5 days-- to --- 97.5% of patients are symptomatic within 11.5 days.
7. rephrase -- To the best of our knowledge, there is limited data available in Iraq regarding arterial thrombosis leading to acute limb ischemia in a COVID-19 patient.
8. case report part needs to be edited extensively -- **pertinent exam needs to summarized in one line and needs to been order.**
9. skip this line-- The patient underwent a blood test, electrocardiogram (ECG), Doppler study for lower limb arterial examination, and chest radiograph.

10. Imaging studies should be written **together and in order** -- chest x ray/ ct scan / doppler followed by management and outcome.
11. The left lower limb was non-viable up to the mid-leg, meaning that the patient was a good candidate for amputation. However, the patient was still unstable and unfit for such a surgery ----
both these lines need to be edited / rewritten --
12. Our patient had no comorbidities and presented with acute lower limb ischemia as an early feature to COVID-19 infection before the development of fever or other respiratory features--- CHANGE TO Our patient had no comorbidities and presented with acute lower limb ischemia as an early feature **of** COVID-19 infection before the development of classic respiratory symptoms.
13. In addition, our patient did not undergo surgery due to her instability and metabolic derangement,--**specify what metabolic derangement / was patient hemodynamically unstable?**

Is the background of the case's history and progression described in sufficient detail?

Yes

Are enough details provided of any physical examination and diagnostic tests, treatment given and outcomes?

Yes

Is sufficient discussion included of the importance of the findings and their relevance to future understanding of disease processes, diagnosis or treatment?

Partly

Is the case presented with sufficient detail to be useful for other practitioners?

Yes

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Internal Medicine / Cardiology.

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard, however I have significant reservations, as outlined above.

The benefits of publishing with F1000Research:

- Your article is published within days, with no editorial bias
- You can publish traditional articles, null/negative results, case reports, data notes and more
- The peer review process is transparent and collaborative
- Your article is indexed in PubMed after passing peer review
- Dedicated customer support at every stage

For pre-submission enquiries, contact research@f1000.com

F1000Research