American Journal of Case Reports

e-ISSN 1941-5923
© Am J Case Rep, 2021; 22: e932733
DOI: 10.12659/AJCR.932733

Received: 2021.04.15
Accepted: 2021.07.02
Available online: 2021.07.11
Published: 2021.08.20

A Periaortitis Patient Who Succumbed to COVID-19 While Undergoing Systemic Steroid Therapy: A Case Report and Literature Review

Authors' Contribution:
Study Design A
Data Collection B
Statistical Analysis C
Data Interpretation D
Manuscript Preparation E
Literature Search F
Funds Collection G

ABEF 1 Ammar Abu Baker
DG 1 Qusai Aljarrah
BE 1 Mohammad Asim Eyadeh
DE 2 Kusai Al-Muqbel
ADE 3 Mohammed Z. Allouh

1 Department of General and Vascular Surgery, King Abdullah University Hospital (KAUH), Jordan University of Science and Technology, Irbid, Jordan
2 Department of Diagnostic Radiology and Nuclear Medicine, King Abdullah University Hospital (KAUH), Jordan University of Science and Technology, Irbid, Jordan
3 Department of Anatomy, College of Medicine and Health Sciences, United Arab Emirates University, Al Ain, United Arab Emirates

Mohammed Z. Allouh, ORCID ID# 0000-0003-0105-6260
Corresponding Author: Mohammed Z. Allouh, e-mail: m_allouh@uaeu.ac.ae
Conflict of interest: None declared

Patient: Male, 62-year-old
Final Diagnosis: COVID-19 • periaortitis
Symptoms: Abdominal pain • dry cough • fatigue • shortness of breath
Medication: —
Clinical Procedure: Mechanical ventilation
Specialty: Critical Care Medicine

Objective: Unusual clinical course

Background: Periaortitis is an inflammatory condition that typically involves the infrarenal portion of the abdominal aorta. It is a rare disease usually occurring in middle-aged men. Coronavirus disease-2019 (COVID-19) is caused by the SARS-CoV-2 virus. The published literature on the management of steroid therapy in patients with periaortitis and infected with SARS-CoV-2 is lacking. The balance between the indispensable anti-inflammatory properties of steroids and their adverse immunosuppressive characteristics remains unclear in the current COVID-19 scenario, and most of the current practices in managing potentially autoimmune aortic conditions are extrapolated from patients with rheumatological disorders contracting COVID19 while undergoing maintenance steroid therapy.

Case Report: This report describes the case of a 62-year-old man who presented with nonspecific lower abdominal pain, unremarkable clinical exam, significantly elevated CRP level, and positive antinuclear antibody test. A CT scan showed mild aortic aneurysmal dilatation with periaortic soft tissue thickening, and a PET scan confirmed the finding, showing active abdominal periaortitis. Accordingly, he was diagnosed with autoimmune periaortitis and was maintained on a high dose of systemic corticosteroids (35 mg prednisolone/d). Eight weeks later, he was readmitted to the intensive care unit with worsening respiratory symptoms due to SARS-CoV-2 infection confirmed by PCR test, and unfortunately died 44 days later due to COVID-19-induced respiratory failure and sepsis.

Conclusions: The lack of an international consensus on the management of SARS-CoV-2-positive, steroid-dependent patients with serious inflammatory aortic conditions mandates further investigations and thoughtful review of the guidelines for the management of steroid-dependent patients contracting SARS-CoV-2 infection. Additionally, a comprehensive analysis of the outcomes of these patients is essential.

Keywords: COVID-19 • Methylprednisolone • Prednisolone • Retroperitoneal Fibrosis

Full-text PDF: https://www.amjcaserep.com/abstract/index/idArt/932733

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Background

Periaortitis is a relatively uncommon condition, with an annual incidence of 0.2-0.5/100,000 individuals, without ethnic predispositions [1]. This inflammatory condition arises from the aortic wall adventitia and extends to the periaortic space around it and the lower abdominal aorta. Although the common iliac arteries are the most commonly affected, other vascular territories have also been simultaneously implicated [2]. Periaortitis is clinically classified into the following 2 major entities: idiopathic and secondary. Secondary causes include malignancies, infections, and other proliferative disorders [2,3]. This disease can lead to serious complications, the most important being dissection of the aorta and ureter obstruction that leads to renal failure [4].

Patients diagnosed with idiopathic periaortitis are typically treated by glucocorticoids (GCs) and immunomodulators. However, such treatment should not be initiated until all secondary causes are excluded [2]. Steroids have immunosuppressive characteristics, and in the current era of the unprecedented COVID-19 pandemic, evidence-based management of steroid-dependent patients contracting SARS-CoV-2 infection remains unclear. The lack of an international consensus on the management of COVID-19 patients who are steroid-dependent with serious inflammatory aortic conditions warrants a comprehensive analysis of the outcomes of steroid-dependent patients contracting SARS-CoV-2 infection.

Case Report

A 62-year-old man was diagnosed with periaortitis and had contracted SARS-CoV-2 infection while on high-dose corticosteroids (35 mg prednisolone/d). Owing to the symptoms of extreme shortness of breath and a constant dry cough, the patient presented to the emergency department and was admitted to our hospital. His past medical history consisted of type 2 diabetes mellitus (DM) for the prior 4 years and a current HbA1c level of 6.3%; furthermore, he had been a smoker for the past 40 years and used to smoke approximately 80 packs per year. He had no history of ischemic heart disease or dyslipidemia.

The patient presented to the hospital 6 weeks before his current admission with diffuse, dull abdominal pain and generalized fatigue. The pain was unaffected by motion and not relieved by rest. His initial inflammatory markers were elevated with a C-reactive protein (CRP) level of 163 mg/dL. Furthermore, the initial screening for autoimmune diseases revealed an antinuclear antibody level of 80; however, he tested negative for the presence of antineutrophilic cytoplasmic antibody, myeloperoxidase antibody, and proteinase 3 antibody. After performing the relevant radiological tests, including an abdominal computed tomography (CT) scan (**Figure 1**) and positron emission tomography (PET) scan (**Figure 2**), the patient was diagnosed with autoimmune periaortitis. The abdominal CT and PET scans are considered the non-interventional diagnostic choices for cases of periaortitis. Accordingly, the patient was admitted to

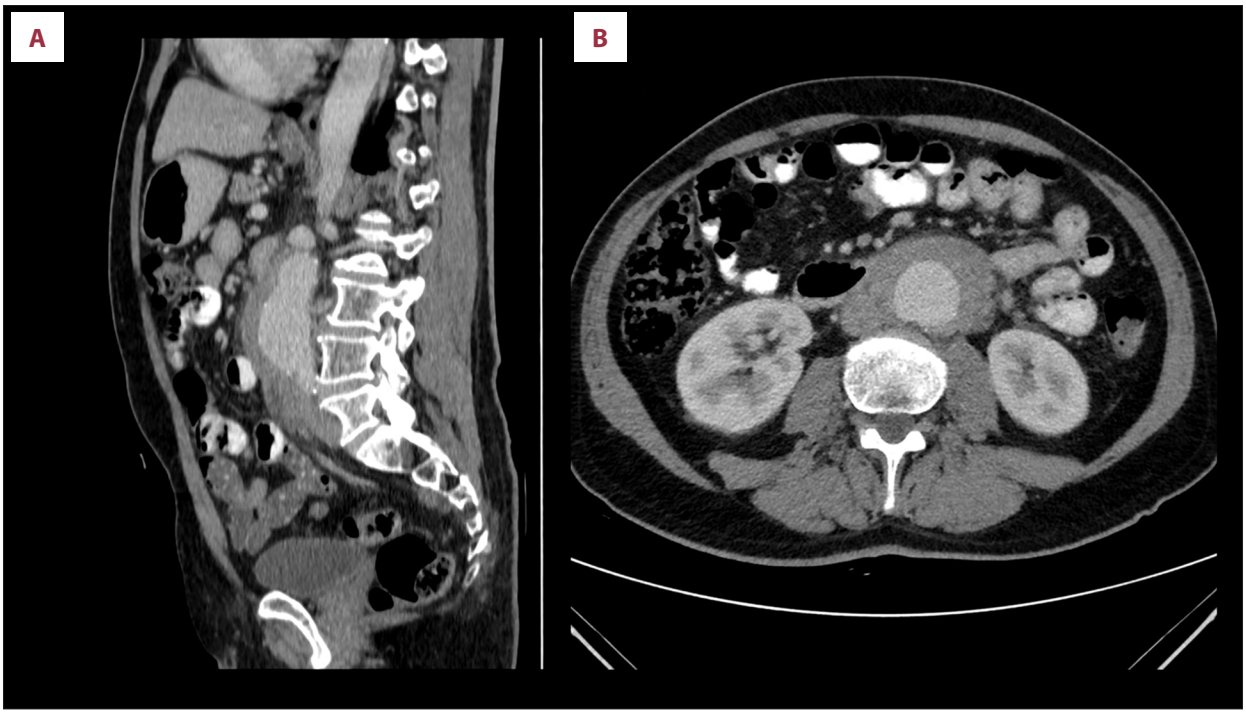

Figure 1. (**A**) Sagittal and (**B**) axial computed tomography images showing aortic aneurysmal dilatation involving the infrarenal portion of the abdominal aorta associated with a mantle of periaortic soft tissue thickening.

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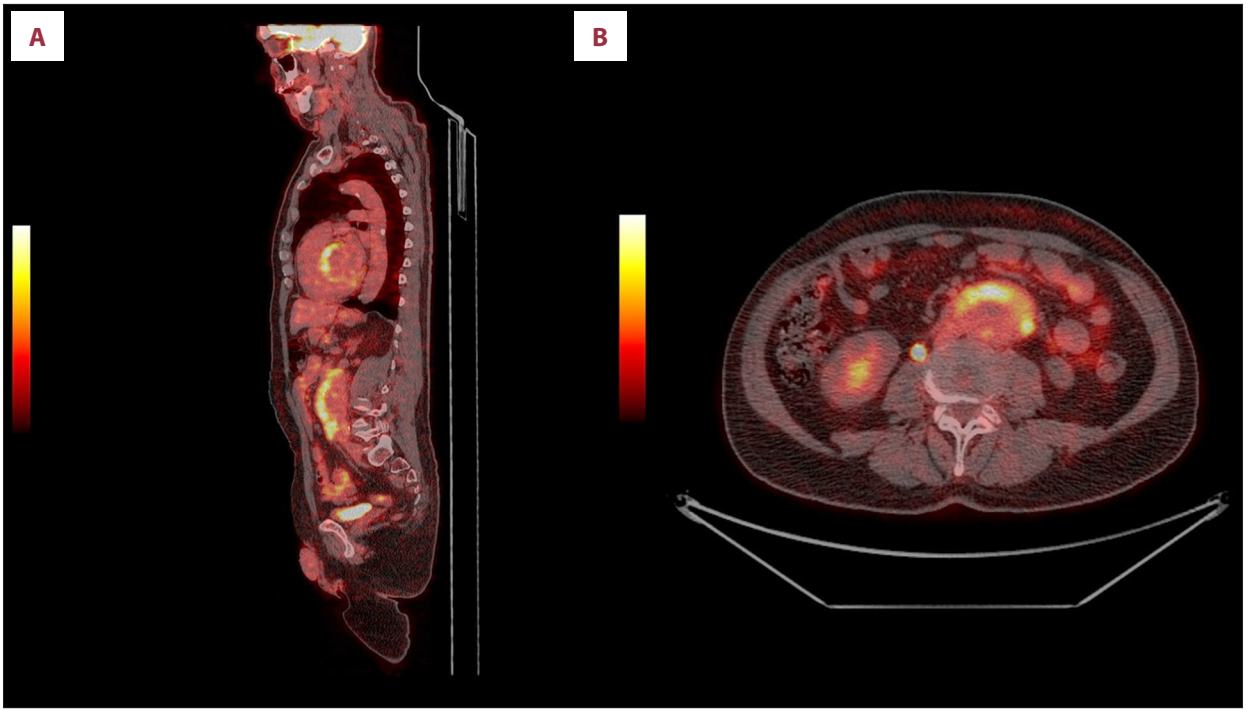

Figure 2. (**A**) Sagittal and (**B**) axial images of positron emission tomography showing aortic aneurysmal dilatation involving the infrarenal portion of the abdominal aorta associated with hypermetabolic soft tissue thickening consistent with active periaortitis.

the hospital and started immunosuppressive therapy with 35 mg prednisolone daily.

The patient was admitted for 4 days, and his clinical status had improved over this period, in which his abdominal pain and fatigue had significantly regressed. In addition, his CRP level decreased to 100 mg/dL, and a decision of discharge was taken. Consequently, the patient was scheduled for 2 follow-up visits, 1 and 3 weeks after discharge, respectively. His CRP level on the first follow-up visit was 90 mg/dL, and it was normalized to less than 10 mg/dL during the last visit. The CRP level, in general, decreases markedly as soon as the inducing factors are eliminated [5]. However, the minute reduction in CRP during the first follow-up visit can be justified by the accompanied infected jaw cyst that the patient was diagnosed with during this follow-up visit.

The intensive steroid therapy complicated his blood sugar levels and induced weight gain. Therefore, he personally decided to quit steroid therapy, which resulted in the recurrence of his initial symptoms of abdominal pain and generalized fatigue. He was counseled about the importance of steroid therapy for his condition, and treatment was reestablished with complete resolution of his symptomatology. Unfortunately, 8 weeks after intensive steroid therapy, he was admitted to the intensive care unit (ICU) due to worsening respiratory symptoms caused by an underlying SARS-CoV-2 infection confirmed by PCR test. The patient eventually developed acute respiratory failure and

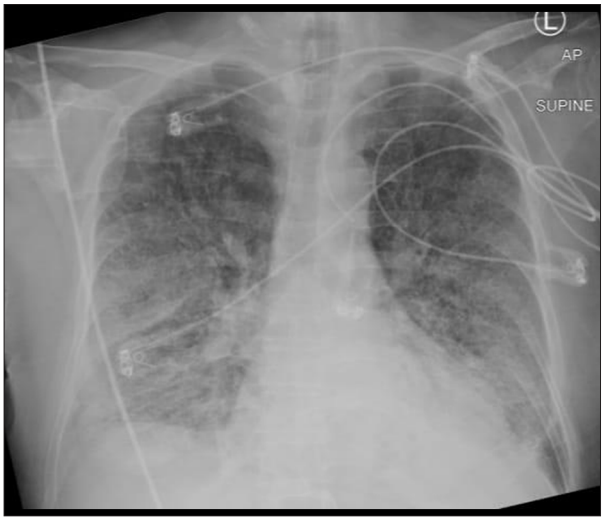

Figure 3. A thoracic radiograph showing diffuse reticulonodular shadowing observed in middle and lower lung zones bilaterally with mild right-sided pleural effusion.

was mechanically ventilated for 10 days before he died. During his ICU stay, intravenous hydrocortisone therapy of 100 mg was initiated twice a day, replacing his previous prednisolone therapy. The patient was also treated with levofloxacin, enoxaparin, lansoprazole, and remdesivir, according to Jordan's national protocol guidelines for the treatment of patients with severe SARS-CoV-2 infection. A chest X-ray (**Figure 3**) revealed

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COVID-19-related lung complications. The patient died before he could receive a chest CT scan to follow up with his periaortic inflammatory condition.

Discussion

It is important to identify the cause of periaortitis since the management plan will differ accordingly [2]. Patients diagnosed with periaortitis should be followed up with various radiological investigations, which are vital in excluding the secondary causes from the differential diagnoses and are also important in managing any complications that may worsen the patient's current status [2]. In our patient, no secondary causes could be identified; therefore, an idiopathic periaortitis was confirmed and GC therapy was initiated. A PET scan can predict the response to GC treatment because the presence of metabolically active uptake of the radioactive substance ([^{18}F]-Fluorodeoxyglucose) implies that the disease will respond, whereas inactive uptake implies a less likely response [6]. Our case supports this fact, given that when the uptake was favorable, the patient showed significant improvements.

Immunosuppressive therapy with steroids remains the first-line treatment in patients with idiopathic periaortitis [7]. To date, the presence of SARS-CoV-2 infection in a patient with periaortitis has not been reported in the published literature. The unfortunate combination of a relatively rare aortic condition with SARS-CoV-2 infection has generated a clinical dilemma on the outcome of steroid-dependent patients contracting this infection. The current management of SARS-CoV-2-infected patients who are on steroids or immunomodulators is extrapolated from the published literature on patients with inflammatory bowel disease (IBD) who contracted SARS-CoV-2 infection while undergoing maintenance steroid therapy. The effect of GCs on SARS-CoV-2 infection is related to the timing of administration and serum blood levels of the steroid. When a COVID-19 patient is already on high dosages of corticosteroids, the drugs would typically suppress his immunity. This, in turn, will increase the viral load, consequently leading to detrimental effects [8]. Corticosteroids also suppress lung inflammation; however, they inhibit the antiviral immune response, leading to a major controversy when used in inflammatory conditions [9]. As these drugs affect the immune system's signaling pathway, they should theoretically elevate the risk of developing a severe form of COVID-19 disease [10]. A recent systematic review that involved patients with IBD coinfected with SARS-CoV-2 has demonstrated a favorable mortality rate in patients treated with immunomodulators compared with those on steroids [11]. Another recent systematic review concluded that the use of corticosteroids during the pandemic should be avoided, in contrast to biological agents [12]. Furthermore, a large-cohort study by Gupta et al revealed that early administration of tocilizumab in some cases of severe COVID-19 might be associated with favorable outcomes [13]. However, our national guidance for COVID-19 management does not include tocilizumab in the treatment protocol; thus, our patient did not receive this medication.

Our patient was maintained on prednisolone when he contracted SARS-CoV-2 infection, which consequently raises the question of whether this increased his risk of developing the infection and/or contributed to the worsening of his condition. The American College of Rheumatology suggests that during the pandemic and due to conflicting evidence, patients with rheumatoid arthritis (RA) should continue undergoing GC therapy using the lowest effective dose to avoid the adverse effects of abrupt withdrawal [14]. However, the American Gastroenterological Association indicates that patients with IBD who are in remission and develop symptomatic COVID-19 should be tapered from their GCs. Additionally, if they are currently being treated with immunomodulators (eg, methotrexate and thiopurines), those drugs should also be stopped until the associated infection has resolved [15].

In a systemic review that included 44 studies on corticosteroid use in COVID-19 patients, prednisolone was the most frequently prescribed GC [11]. Prednisolone showed the beneficial effects of steroids in cases of moderate or severe respiratory failure, but the sample was too small to examine the effect of the dosage, type, or timing of the administered corticosteroid [11]. Based on substantial evidence from the Randomized Study of COVID-19 Therapy (RECOVERY) trial [16], the National Institutes of Health (NIH) recommends the use of dexamethasone in those who are mechanically ventilated or need supplementary oxygen. Several other clinical trials involving various forms of steroids were halted after the RECOVERY trial was released, possibly due to their limited sample size or inadequate data. If dexamethasone is not available, alternative GCs such as prednisone, methylprednisolone, and hydrocortisone may be used with complete daily dose equivalencies to 6 mg dexamethasone (oral or intravenous), according to the NIH.

Conclusions

This report presents a unique case of a periaortitis patient on systemic steroid therapy who died after contracting SARS-CoV-2 infection. The lack of an international consensus on the management of these cases mandates further investigations and thoughtful review of the guidelines for the management of steroid-dependent patients contracting SARS-CoV-2 infection.

Conflict of Interest

None.

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Declaration of Figures Authenticity

All figures submitted have been created by the authors who confirm that the images are original with no duplication and have not been previously published in whole or in part.

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