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CASE REPORT

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Unusual imaging findings of SARS-CoV-2 in HIV-positive patient: A case report

Yahya Charifi[1] | **Samira Rabhi**[2] | **Ghita Sekkat**[1] | **Meryem Haloua**[1] | **Moulay Youssef Alaoui Lamrani**[1] | **Yassine Ouadnouni**[3] | **Meryeme Boubbou**[1] | **Mustapha Maaroufi**[1] | **Badreeddine Alami**[1]

[1]Department of Radiology and Medical imaging, CHU Hassan II FEZ Sidi Mohammed Ben Abdellah University, Fez, Morocco

[2]Department of Internal Medicine, CHU Hassan II FEZ Sidi Mohammed Ben Abdellah University, Fez, Morocco

[3]Department of Thoracic Surgery, CHU Hassan II FEZ Sidi Mohammed Ben Abdellah University, Fez, Morocco

Correspondence
Yahya Charifi, Department of Radiology, CHU Hassan II FEZ Sidi Mohammed Ben Abdellah University, Fez, Morocco.
Email: y.charifi92@gmail.com

Abstract

Considering SARS-CoV-2 as a major differential diagnosis of pneumocystis in HIV-positive patients even if the lesions are typical.

KEYWORDS

CT scan, cystic lesions, HIV, SARS-CoV-2

1 | INTRODUCTION

We report the case of a 34-year-old man diagnosed HIV positive, who was admitted with dyspnea and fever; given the epidemic context, SARS-CoV-2 infection was suspected, so an RT-PCR for SARS-CoV2 analysis of sputum samples was done and was positive. Chest CT scan revealed diffuse and peripheral ground glass opacities associated with cystic lung lesions, this pattern was suggestive of pneumocystis, that is why a bronchoalveolar lavage was performed, but it was negative. In this case, we will study the clinical, radiological, therapeutic, and prognosis features of SARS-CoV-2, especially in HIV-infected patients. We will also show the possibility of cystic lesions as a radiological presentation in HIV—SARS-CoV-2 coinfected patients, and how they can be similar to pneumocystis infection.

The world is facing a major health crisis due to the pandemic infection by the new SARS-CoV-2, since December 2019, when the epidemy began in Wuhan, China.[1] By the beginning of September 2020, more than 30 million people were infected and more than 900 000 died. People infected with HIV have a generally high risk of opportunistic infections. SARS-CoV-2 currently presents a major challenge to be considered. People with comorbidities, low CD4 cell counts, or high HIV RNA viral charge are most at risk.

Imaging, and especially chest computed tomography (CT), plays a key role in the management of SARS-CoV-2 pneumonia. Indeed, it is important for diagnosis, prognosis, and follow-up. It shows parenchymal and extraparenchymal abnormalities and earliest manifestations as ground glass opacities,which can be also seen on pneumocystis in the context of HIV infection.

In the literature, only a few cases of SARS-CoV-2 in HIV-infected patients have been reported. We describe the clinical characteristics, biology, and imaging findings of SARS-CoV-2 in an HIV-infected patient, we also discuss the typical imaging findings of pneumocystis infection.

2 | CASE REPORT

A 34-year-old man was known to be HIV positive. He was receiving, with poor compliance, a single fixed-dose combination tablet containing tenofovir/emtricitabine/effavirenz as first-line treatment. He was admitted to our hospital for a fever, cough, and shortness of breath that had been progressing for a week, associated with digestive symptoms including diarrhea and vomiting.

A noncontrast chest CT scan was done and showed the presence of diffuse and peripheral ground glass opacities, predominantly in posterior lobes (Figure 1), associated with cystic lung lesions (Figure 2), which are more specific to an opportunistic pneumocystis infection given the context of immunosuppression. An infection with the new coronavirus SARS-CoV-2 was also suspected due to his previous contact with a confirmed case of SARS-CoV-2, an RT-PCR analysis of sputum samples was performed and came back positive; on the other hand, a bronchoalveolar lavage was carried out to check for pneumocystis, and was negative. His ARN viral charge was high at 5.23 log (169 000 copy/mL), and the CD4 count was low at 230/mm^3.

We mention that HIV viral load tests measure the amount of HIV in the blood.

Indeed, the number of copies of a particular part of the virus called RNA or ribonucleic acid is counted in the laboratory. The result of the viral load test is expressed as the number of copies per milliliter (mL) of blood. Results can vary widely; the lower limit of HIV RNA detection goes down to 40 copies/mL. High viral loads are linked to rapid disease progression, while viral loads at "undetectable" levels slow or stop disease progression.

The patient was hospitalized; his vital signs showed a saturation of 80% in the ambient air and 88% under oxygen at 2 L/min. The results of the blood tests showed a C-reactive protein concentration of 30 mg/L (normal < 5 mg/L), leukocytes 7360 (4000-10 000 cells/mL) with neutrophils 6650 (2000-7000 cells/mL), and lymphocytes 260 (900-5200 cells/mL).

During his hospitalization, our patient was closely monitored and treated by the therapeutic protocol adopted by the Ministry of Health in Morocco based on association between the use of hydroxychloroquine for 10 days, Azithromycin for 5 days, with brief corticosteroid therapy (5 days). He also restarted his antiviral tri-therapy. During 20 days of hospitalization, he remained stable with improved respiratory function at 90% saturation in the ambient air. He was discharged after consecutive two respiratory specimens tested negative by two RT-PCR taken at 24 h apart.

3 | DISCUSSION

Coronavirus disease 2019 (SARS-CoV-2) is caused by a new form of coronavirus, SARS-CoV-2 (severe acute respiratory syndrome coronavirus 2), which appeared in China in December 2019 and is the source of the current pandemic. According to epidemiological reports, the incubation period of SARS-CoV-2 infection is 3-14 days, and the new coronavirus nucleic acid can be detected in nasopharyngeal swabs, sputum, lower respiratory tract secretions, and stool of most patients. In the early phase of the infection, white blood cell levels were normal or lower than normal, and lymphocyte counts were mostly very low.[2]

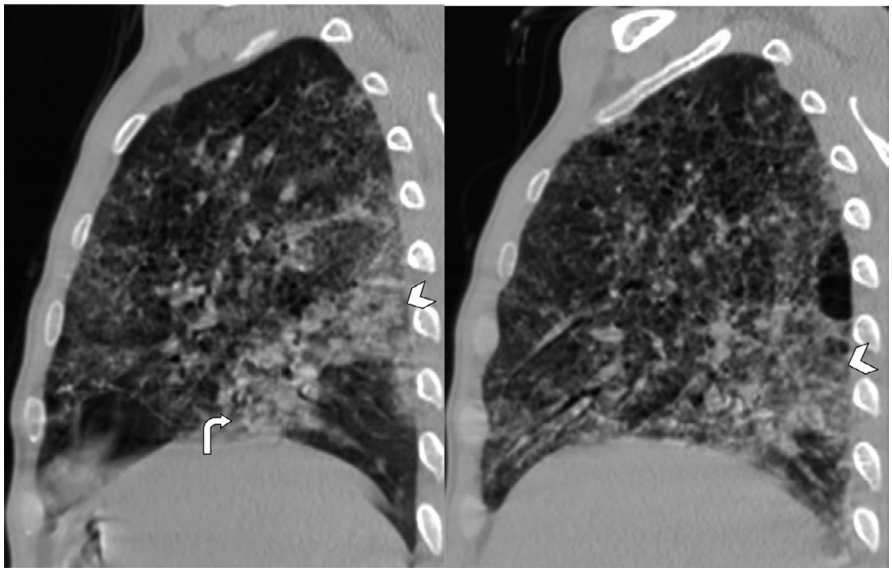

FIGURE 1 Noncontrast chest CT scan images in sagittal views showing diffuse and peripheral ground glass opacities, predominantly in posterior lobes (arrowhead). It is associated with basal consolidations (curved arrowhead)

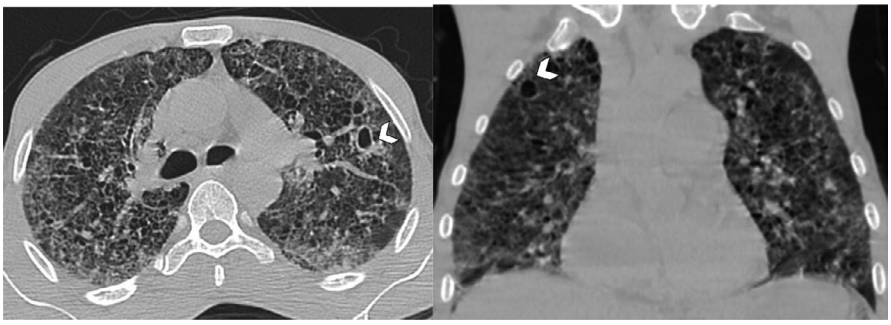

FIGURE 2 Noncontrast chest CT scan images in axial and coronal views show parenchymal cavities and cystic lesions (arrowheads)

Few cases of SARS-CoV-2 in HIV-infected patients have been reported in the literature. The clinical presentation in these patients is classic including fever, cough, anosmia, and digestive disorders as in our case.[3,4] The most common types of comorbidities in HIV-positive patients and SARS-CoV-2 were hypertension, obesity or hyperlipidemia, chronic obstructive pulmonary disease, and diabetes. Indeed, one cohort study showed that multimorbidities (mostly hypertension and diabetes) were more common in patients coinfected with SARS-CoV-2-HIV than in HIV non-SARS-CoV-2 cases[5] (Table 1).

Chest computed tomography (CT) represents a cornerstone in the management of SARS-CoV-2 pneumonia; indeed, it is particularly important for the diagnosis, prognosis, and evaluation of the efficacy of patients' treatment.

The typical early manifestations of SARS-CoV-2 pneumonia on a chest CT scan are the multiple ground glass opacities which are preferentially located in the posterior lower lobe and in the subpleural regions of both lungs. As the disease progresses, the lesions may expand and grow with consolidation. In addition, other accompanying signs on CT imaging can be found including subpleural line, bronchiectasis, and less frequently, inverted halo sign, vascular enlargement, pleural thickening, and central lobular nodules.[6,7]

Finally, some signs are rarely reported in the literature including cystic lung lesions and spontaneous pneumomediastinum that may be caused by a pressure gradient between the alveoli and lung interstitium, leading to alveolar rupture.[8-11]

However, to our knowledge, it has never been reported previously that cystic lesions occur in HIV—SARS-CoV-2 coinfected patients, as in our case, but some authors have noticed the appearance of these cystic lesions during a late-phase stage usually in combination with signs of fibrosis.[12,13]

On the other hand, it should be noted that cystic lung disease is a relatively common manifestation in HIV patients. It is most often associated with Pneumocystis jirovecii pneumonia (PCP).[14] Indeed, before the outbreak of the AIDS epidemic, cystic lesions had only been reported in three patients with PCP. It seems likely that patients with AIDS generate a different host response to PCP than patients with other types of immunological dysfunction.[15]

Besides, HIV may be an independent risk factor for chronic obstructive pulmonary disease (COPD), particularly for emphysema. Nonsmoking HIV-infected patients have higher rates of emphysema than nonsmoking non-HIV-infected patients.[16]

The pathogenesis of COPD in HIV infection remains uncertain, and according to some studies, it probably involves multiple mechanisms: immunologic, apoptotic, proteolytic, and oxidative stress.[17]

Histologically, recent studies have shown some diffuse bilateral alveolar lesions with cellular fibromyxoid exudates in SARS-CoV-2 infection.[18] The small pulmonary cystic lesions could be explained by focal bleeding and necrosis of the lung tissue; they are formed after drainage through the bronchioles. In the other hand, these small lesions could also be explained due to blockage of the bronchioles of the lungs by mucus plugs, leading to excessive swelling of the alveoli, rupture of the alveolar septum, and subsequent formation of small cavities.[19] Our patient had a CD4 lymphocyte count of 230, and for this reason, he is comparable to many immunosuppressed patients, such as organ transplant patients.

SARS-CoV-2 infection in transplant patients has been cited in some series as the same as HIV.

Studies of liver and kidney transplant patients in China and Italy have shown that immunosuppressed patients are not exposed to an increased risk of serious complications compared with the general population, both in children and adults.[20]

Currently, the largest series of kidney transplant recipients with SARS-CoV-2 (36 patients) reported a 28% mortality rate at 3 weeks from initial disease presentation, which is a significant difference from the mortality rate of liver transplant recipients and HIV patients.[21,22]

The therapeutic approach shows that the majority of these patients recovered within 7-14 days under symptomatic treatment. Antibiotic therapy combined with hydroxychloroquine, as in our case, was the basis of the treatment.[3] Some authors have supposed that HIV-1-infected patients receiving antiretroviral therapy may have a lower risk of SARS-CoV-2 and its associated complications, due to the in vitro activity of some antiretroviral drugs against SARS-CoV-2 and their defective cellular immunity, leading to a decreased possibility

TABLE 1 Main characteristics of coinfected HIV and COVID-19 patients

Patient No	Age	Comorbidities	Clinical features	Diagnosis	CD4	Treatment	Duration of hospitalization	Outcomes and follow up	References
1	36	HIV	Fever, Cough, Dyspnea. Diarrhea + Vomiting	NP Swab	230	Antiretroviral Hydroxychloroquine Azythromycin	20 d	Recovered	Current Study
2-6	29-49	HIV Asthma: 1 Hypothyroidism: 1	Fever, Cough, malaise, dyspnea	NP Swab	13-1140	Antiretroviral Hydroxychloroquine Azythromycin	1-21 d	Recovered: 4	[27]
7-58	Mean: 53	HIV Chronic liver disease Hypertension Chronic Cardiac disease	Fever Cough Dyspnea	NP Swabs Sputum Lower respiratory tracts	Mean: 565	Antiretroviral Hydroxychloroquine Azithromycin Corticosteroids	Mean 8 d	Recovered: 44	[5]
59-69	Mean: 56	HIV Hypertension Diabete	Fever Cough Diarrhea + Vomiting	NP Swabs	295-1350	Antiretroviral Antibiotics Hydroxychloroquine	8-45 d	Recovered: 9	[3]
70-96	Mean: 53.8	HIV	Fever, Cough, Fatigue, Dyspnea	OP and/or NP Swabs	Mean: 350	Antiretroviral Hydroxychloroquine Enoxaparin	Mean 9.2 d	Recovered: 22	[28]

of cytokine dysregulation which results severe lung damage.[23,24] But in the current case, the patient was not compliant with his medications.

Regarding the prognosis, there is a potentially higher proportion of deaths among HIV—SARS-CoV-2 coinfected patients, due to higher multimorbidity which can reach two-thirds of patients[4] and, therefore, more severe forms of infection. Consequently, current clinical data suggest that the main risk factors for mortality are related to advanced age and multimorbidity.[25]

Our study was based on a single case and is not representative of the HIV-positive population. However, no other research has demonstrated the risk of developing cystic lesions in patients with SARS-Cov-2 and HIV coinfection, such as in pneumocystis, where this type of lesion associated with ground glass is observed in the majority of cases.[26]

4 | CONCLUSION

The clinical presentation of SARS-CoV-2 is almost similar in HIV-infected individuals and the general population, but there are currently no studies on the incidence of SARS-CoV-2 infection in HIV-positive patients compared with immunocompetent subjects.

A few authors have suggested that SARS-CoV-2 may independently lead to the formation of lung cysts; however, no one has reported the occurrence of these atypical lesions in HIV-infected patients.

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CONFLICT OF INTEREST

None declared.

AUTHOR CONTRIBUTION

YC, BA: performed and interpreted the patient's CT scan. SR service adapted treatments procedures to the patient. All authors read and approved the final manuscript.

ETHICAL APPROVAL

Our institution does not require ethical approval for reporting individual cases or case series.

INFORMED CONSENT

Written informed consent was obtained from the patient(s) for their anonymized information to be published in this article.

DATA AVAILABILITY STATEMENT

The data sets are generated on the data system of the CHU hassan II of Fes, including the biological data, the operative report, and the data of the anatomopathological analysis.

ORCID

Yahya Charifi https://orcid.org/0000-0002-7008-7346

REFERENCES

1. World Health Organization. Novel coronavirus-China [EB/OL]. (2020-01-12). https://www.who.int/csr/don/12-january-2020-novel-coronavirus-china/en. Accessed February 10, 2020
2. Wang W, Tang J, Wei F. Updated understanding of the outbreak of 2019 novel coronavirus (2019-nCoV) in Wuhan, China. *J Med Virol*. 2020;92:441-447.
3. Siméon S, Landowski S, Moreau F, et al. Caractéristiques des infections à SARS-CoV-2 chez 10 patients infectés par le VIH. *Med Mal Infect*. 2020;50(6):S72. https://doi.org/10.1016/j.medmal.2020.06.140
4. Mirzaei H, McFarland W, Karamouzian M, Sharifi H. COVID-19 among people living with HIV: a systematic review. *AIDS Behav*. 2020;25:85-92. https://doi.org/10.1007/s10461-020-02983-2
5. Vizcarra P, Pérez-Elías MJ, Quereda C, et al. Description of COVID-19 in HIV-infected individuals: a single-centre, prospective cohort. *Lancet HIV*. 2020;7:e554-e564.
6. Guan HX, Xiong Y, Shen NX, et al. Clinical and thin-section CT features of patients with 2019-nCoV-pneumonia. *Radiol Pract*. 2020;35:02. https://doi.org/10.13609/j.cnki.1000-0313.2020.02.001
7. Shi HS, Han XY, Jiang NC, et al. Radiological findings from 81 patients with COVID-19 pneumonia in Wuhan, China: a descriptive study. *Lancet Infect Dis*. 2020;20:425-434.
8. Bor C, Demirag K, Uyar M, et al. Recurrent spontaneous pneumothorax during the recovery phase of ARDS due to H1N1 infection. *Balkan Med J*. 2013;30:123-125.
9. Sheard S, Rao P, Devaraj A. Imaging of acute respiratory distress syndrome. *Respir Care*. 2012;57:607-612.
10. Kolani S, Houari N, Haloua M, et al. Spontaneous pneumomediastinum occurring in the SARS-COV-2 infection. *IDCases*. 2020;21:e00806. https://doi.org/10.1016/j.idcr.2020.e00806
11. Macklin MT, Macklin CC. Malignant interstitial emphysema of the lungs and mediastinum as an important occult complication in many respiratory diseases and other conditions: interpretation of the clinical literature in the light of laboratory experiment. *Medicine*. 1944;23:281-358. https://doi.org/10.4329/wjr.v6.i11.850
12. Gattinoni L, Caironi P, Pelosi P, et al. What has computed tomography taught us about the acute respiratory distress syndrome? *Am J Respir Crit Care Med*. 2001;164:1701-1711.
13. Liu K, Zeng Y, Xie P, et al. COVID-19 with cystic features on computed tomography: a case report. *Medicine*. 2020;99(18):e20175. https://doi.org/10.1097/MD.0000000000020175
14. Llen CM, Al-Jahdali HH, Irion KL, Al Ghanem S, Gouda A, Khan AN. Imaging lung manifestations of HIV/AIDS. *Ann Thorac Med*. 2010;5(4):201-216. https://doi.org/10.4103/1817-1737.69106
15. Panicek DM. Cystic pulmonary lesions in patients with AIDS. *Radiology*. 1989;173(1):12-14. https://doi.org/10.1148/radiology.173.1.2780998

16. Morris A, George MP, Crothers K, et al. HIV and chronic obstructive pulmonary disease: is it worse and why? *Proc Am Thorac Soc*. 2011;8(3):320-325.
17. Crothers K. Chronic obstructive pulmonary disease in patients who have HIV infection. *Clin Chest Med*. 2007;28(3):575-587, vi.
18. Xu Z, Shi L, Wang Y, et al. Pathological findings of COVID-19 associated with acute respiratory distress syndrome. *Lancet Respir Med*. 2020;8(4):420-422. https://doi.org/10.1016/S2213-2600(20)30076-X
19. Chen J, Peng S, Zhang B, Liu Z, Liu L, Zhang W. An uncommon manifestation of COVID-19 pneumonia on CT scan with small cavities in the lungs: a case report. *Medicine*. 2020;99(28):e21240. https://doi.org/10.1097/MD.0000000000021240
20. Bhoori S, Rossi RE, Citterio D, Mazzaferro V. COVID-19 in long-term liver transplant patients: preliminary experience from an Italian transplant centre in Lombardy. *Lancet Gastroenterol Hepatol*. 2020;5(6):532-533. https://doi.org/10.1016/S2468-1253(20)30116-3
21. Akalin E, Azzi Y, Bartash R, et al. Covid-19 and kidney transplantation. *N Engl J Med*. 2020;382:2475-2477.
22. Kumar RN, Tanna SD, Shetty AA, Stosor V. COVID-19 in an HIV-positive kidney transplant recipient. *Transpl Infect Dis*. 2020;22:e13338.
23. Dauby N. Potential impact of COVID-19 in people living with HIV: experience from previous 21st century coronaviruses epidemics. *AIDS*. 2020;34:1255-1256. https://doi.org/10.1097/qad.0000000000002555
24. Toombs JM, Van den Abbeele K, Democratis J, et al. COVID-19 in 3 people living with HIV in the United Kingdom. *J Med Virol*. 2020;93:107-109. https://doi.org/10.1002/jmv.26178
25. WHO. Clinical management of severe acute respiratory infection when novel coronavirus (nCoV) infection is suspected: interim guidance. World Health Organization. 2020. https://apps.who.int/iris/handle/10665/330854. Accessed January 25, 2020
26. Kanne JP, Yandow DR, Meyer CA. Pneumocystis jiroveci pneumonia: high-resolution CT findings in patients with and without HIV infection. *AJR Am J Roentgenol*. 2012;198(6):W555-W561. https://doi.org/10.2214/AJR.11.7329
27. Blanco JL, Ambrosioni J, Garcia F, et al. COVID-19 in patients with HIV: clinical case series. *Lancet HIV*. 2020;7(5):e314-e316.
28. Calza L, Bon I, Tadolini M, et al. COVID-19 in patients with HIV-1 infection: a single-centre experience in northern Italy. *Infection*. 2021;49:333-337.

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