


Clinical and laboratory characteristics of hepatitis C and COVID-19 coinfection: Prolonged RNA shedding in nonhospitalized case

Livia Melo Villar¹  | Vanessa Salette de Paula² | Laura Cristina Machado Pinto¹ | Bianca Cristina Leires Marques¹ | Vanessa Duarte da Costa¹ | Lucas Lima da Silva¹ | Alanna Calheiros Santos¹ | Giselle Prado do Nascimento¹ | Juliana Custódio Miguel¹ | Ana Carolina da Fonseca Mendonça^{1,3} | Fernando Couto Motta³ | Lia Laura Lewis-Ximenez¹

¹Brazilian Reference Laboratory of Viral Hepatitis, Oswaldo Cruz Institute, FIOCRUZ, Rio de Janeiro, Brazil

²Molecular Virology Laboratory, Oswaldo Cruz Institute, FIOCRUZ, Rio de Janeiro, Brazil

³Brazilian Reference Laboratory for Respiratory Viruses, Oswaldo Cruz Institute, FIOCRUZ, Rio de Janeiro, Brazil

Correspondence

Livia Melo Villar, Viral Hepatitis Laboratory, Helio and Peggy Pereira Pavillion - Ground Floor - Room B09, FIOCRUZ Av. Brasil, 4365 - Manguinhos - Rio de Janeiro, RJ 210360-040, Brazil.
Email: lvillar@ioc.fiocruz.br

Funding information

Study has financial support of Oswaldo Cruz Foundation and Brazilian Health Ministry.

Abstract

Nonhospitalized COVID-19 and hepatitis C-coinfected patient presented prolonged RNA shedding and mild course of infection. This finding demonstrated the importance of long follow-up of these patients.

KEYWORDS

coinfection, COVID-19, follow-up, HCV, SARS-CoV-2 persistency

1 | INTRODUCTION

A little is known about the clinical and laboratory characteristics of COVID-19 and hepatitis C virus (HCV) coinfection. Here, we described a coinfection case that presented a long viral shedding what could increase the potential for development of severe immune suppression in these patients.

Severe acute respiratory syndrome-corona virus-2 (SARS-CoV-2) causes coronavirus disease 2019 (COVID-19) that was first reported in China leading to pandemic all over the

world. Some studies have reporting asymptomatic infection to severe cases of COVID-19.¹⁻³ Even though there is a high risk of severe illness among elder individuals and those presenting medical comorbidities,³ there are limited data about clinical and laboratory characteristics of COVID-19 and hepatitis coinfection.

Studies conducted in hospitalized patients with COVID-19 demonstrated elevated AST and ALT and slightly elevated bilirubin, which ranges from 14% to 53%.⁴⁻⁸ Severe cases of COVID-19 usually presented severe

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liver injury.^{1,6-8} A little is known about the mechanism of the liver injury. In COVID-19, it suggests that inflammation serves as a significant driver of disease progression. Severe COVID-19 cases could experience a phenomenon termed “cytokine storm” characterized by noticeably elevated plasma levels of pro-inflammatory cytokines such as interleukin (IL)-2, IL-6, tumor necrosis factor- α , and other cytokines.⁹⁻¹² It is also possible that SARS-CoV-2 can lead to direct cytopathic damage since virus could enter via receptors angiotensin-converting enzyme 2 (ACE2) in the liver.¹³

Hepatitis C virus infection is responsible for 71 million of cases all over the world.¹⁴ WHO estimated that in 2016, approximately 399 000 people died from hepatitis C, mostly from cirrhosis and hepatocellular carcinoma (primary liver cancer). In Brazil, prevalence varies from 0.2% to 47% according geographical region or the group evaluated, such as drug users, inmates, Amerindians, people living with HIV, patients with hematological disorders, and chronic kidney disease patients.¹⁵⁻¹⁸ Kandeel et al¹⁹ have evaluated the potential of antiviral drugs used for hepatitis C, like sofosbuvir, and daclatasvir, to build a model for COVID-19 treatment. In addition, it was observed fulminant outcome or reactivation of hepatitis infection during hepatitis B and COVID-19 coinfection.^{20,21} However, there is a lack of data about clinical course and laboratory findings of HCV and COVID-19 coinfection. COVID-19 patients with pre-existing hepatitis C could present an uncommon presentation that could impact in their health status or in the epidemiological characteristic of these diseases.

In this case, we reported clinical course and laboratory data of hepatitis C patient infected with COVID-19 showing prolonged RNA viral shedding.

2 | CASE REPORT

A 59-year-old female presenting HCV infection was referred to Viral Hepatitis ambulatory on May 7th, 2020, reporting symptoms related to COVID-19 infection. She presented dry cough and fatigue for 7 days before first visit and had no history of: diabetes, hypertension, previous treatment to HCV, vaccination to influenza, drug use, or blood transfusion. She reported previous surgery as probable risk factor of acquisition of HCV and possible contact with COVID-19-infected individual. She did not present fever and had normal pulse, breath, and blood pressure during the follow-up.

At first visit, her laboratory tests showed normal levels of total bilirubin (0.31 mg/dL), aspartate aminotransferase (20 U/L), alanine aminotransferase (28 U/L), serum urea (24 mg/dL), creatinine (0.64 mg/dL), platelet count (2.53×10^5 cells/ μ L), hemoglobin (13.4 g/dL), hematocrit

(39.7%), GGT (54 U/L), protein C-reactive (0.21 mg/dL), glucose (106 mg/dL), and phosphatase alkaline (93 U/L). She had anti-HCV positive with HCV viral load of 6.06 log IU/mL and genotype 1a, HBsAg, and anti-HBc negative and anti-HBs reactive (titer of 137 IU).

At second (15 days after first consultation), third (30 days after first consultation), and fourth (45 days after first consultation) appointments, hematological and biochemical tests were still normal (Table 1). However, patient reported dry cough and fatigue until third appointment, and 30 days after the first consultation she reported headache and tiredness. SARS-CoV-2 RNA was detected in nasopharyngeal swab in the first, second, and third visit (about 28 days of detection) and was not detected at 45 days after first consultation. HCV RNA viral load remains the same during the follow-up (about 6 log IU/mL). Patient was telemonitored, and hygiene measures and isolation were recommended.

Immune response to SARS-CoV-2 was evaluated by testing the serum total antibody (Ab) and IgM Abs specific for SARS-CoV-2 using chemiluminescence kits supplied by Roche according to the manufacturer's instructions. This assay presented sensitivity of 99.4% after 14 days of first PCR-positive test and specificity of 99.8% according manufacturer's instructions. Positive results were obtained at third visit (3.5 COI) and fourth visit (5.2 COI), and viral RNA was detected until third appointment.

3 | DISCUSSION

To date, little is known about clinical course of COVID-19 in hepatitis C patients. We reported a mild case of COVID-19 and HCV coinfection what is quite different than observed in a fulminant case of COVID-19 and HBV coinfection.²¹ Other report has demonstrated HBV reactivation induced by COVID-19 in a young patient presenting with altered mental status and elevated liver enzyme levels.²⁰ In this present report, there was no elevation in biochemical and hematological data that is frequently associated with more severe presentation. Previous studies showed elevated AST and ALT and slightly elevated bilirubin in about 14% to 53% of COVID-19 cases,⁵⁻⁸ but these studies were conducted in hospitalized patients without previous history of hepatitis. It is important to evaluate the causes of liver injury in patients with pre-existing liver disease who have contracted COVID-19.

In the present clinical case, we detected SARS-CoV-2 RNA in nasopharyngeal swab up to 28 days without elevation in biochemical and hematological data. Xu et al²² observed median duration of 17 days of detecting SARS-CoV-2 RNA in NS from onset of symptoms to RNA clearance; however,

TABLE 1 Laboratory tests' data of the patient with a history of coinfection with COVID-19 and hepatitis C

Month of beginning of the COVID-19 symptoms: April, 2020				
Monitoring time:	May 7, 2020	May 21, 2020	June 4, 2020	June 18, 2020
Sars-Cov-2 PCR (swab)	Detected	Detected	Detected	Undetected
Anti-SARS-CoV-2 (CO)	Negative (0.80)	Negative (1.74)	Positive (3.5)	Positive (5.22)
HCV RNA viral load (log IU/mL)	6.0	6.0	6.0	6.0
Red cells (/mm ³)	4.410.000	4.580.000	4.520.000	4.680.000
Hemoglobin (g/dL)	13.4	13.9	13.8	14.2
Hematocrit (%)	39.7	41	40.8	41.9
Mean corpuscular volume (μm ³)	90	89.5	90.3	89.5
White blood cells (/mm ³)	7.650	6.980	8.170	7.590
Platelets (/mm ³)	253.000	268.000	304.000	288.000
ALT (IU/L)	28	41	43	44
AST (IU/L)	20	21	23	24
Alkaline phosphatase (μ/L)	93	96	93	109
GGT range (μ/L)	54	51	48	48
Total bilirubin (mg/dL)	0.31	0.61	0.57	0.37
Indirect bilirubin (mg/dL)	0.19	0.44	0.43	0.27
C-reactive protein (mg/dL)	0.21	0.28	0.24	0.2
Glucose (mg/dL)	106	88	87	94
Urea (mg/dL)	24	43	28	23

Abbreviations: ALT, alanine transaminase; AST, aspartate aminotransferase; COVID-19, Coronavirus disease 2019; GGT, Gamma-glutamyl transferase; HCV, Hepatitis C virus; PCR, Polymerase chain reaction; RNA, ribonucleic acid; SARS-CoV-2, Severe acute respiratory syndrome coronavirus 2.

hypertension patients could have RNA detected until 21 days. Recently, Penchenat et al²³ reported a prolonged 59-day course of COVID-19 in a healthcare provider probably due to either disease reactivation or persistence in Europe. However, there are no data about RNA mean duration in NS samples from HCV-infected individuals. Among liver disease patients, prolonged presence of SARS-CoV-2 RNA could increase the potential for development of severe immune suppression in these patients.

4 | CONCLUSION

This is the first study to report prolonged RNA detection among nonhospitalized COVID-19 and hepatitis C-coinfected patient that presented a mild course of infection. This finding demonstrated the importance of long follow-up of hepatitis C patients even if they present mild cases and the importance to increase the period of isolation in these individuals.

ACKNOWLEDGMENTS

Authors thank to the patient and technicians of Viral Hepatitis Laboratory for analysis.

CONFLICT OF INTEREST

No potential conflict of interest was reported by the authors. The study was approved by National Committee in Ethics Research, and patient has provided informed consent for publication of the case.

AUTHORS' CONTRIBUTION

LMV: involved in supervision, validation, visualization, and writing, reviewing, and editing the original draft. VSP: involved in supervision, reviewing, and editing the original draft. LCM: involved in management of patient and reviewing the original draft. BCLM: involved in data curation, formal analysis, methodology, validation, and visualization. VDC: involved in data curation, formal analysis, methodology, validation, and visualization. LLS: involved in data curation, formal analysis, methodology, validation, and visualization. ACS: involved in data curation, formal analysis, methodology, validation, and visualization. GPN: involved in data curation and methodology. JCM: involved in data curation and methodology. ACFM: involved in data curation and methodology. FCM: involved in data curation and methodology. LLLX: involved in management of patient and reviewing the original draft.

DATA AVAILABILITY STATEMENT

All the data supporting the findings of this study are available within the article.

ORCID

Livia Melo Villar  <https://orcid.org/0000-0001-7644-8969>

REFERENCES

1. Ji D, Zhang D, Yang T, et al. Effect of COVID-19 on patients with compensated chronic liver diseases. *Hepatol Int*. 2020;14(5):701-710. <https://doi.org/10.1007/s12072-020-10058-6>
2. Liu Y, Yan LM, Wan L, et al. Viral dynamics in mild and severe cases of COVID-19. *Lancet Infect Dis*. 2020;20(6):656-657.
3. Yang X, Yu Y, Xu J, et al. Clinical course and outcomes of critically ill patients with SARS-CoV2 pneumonia in Wuhan, China: a single-centered, retrospective, observational study. *Lancet Respir Med*. 2020;8(5):475-481.
4. Luo S, Deng Z, Zhang X, Pan Z, Xu H. Clinical characteristics and outcomes of COVID-19 patients presenting with initial gastrointestinal symptoms in Wuhan, China: a retrospective cohort study. *J Gastroenterol Hepatol*. 2020. <https://doi.org/10.1111/jgh.15199>
5. Bloom PP, Meyerowitz EA, Reinus Z, et al. Liver biochemistries in hospitalized patients with COVID-19. *Hepatology*. 2020. <https://doi.org/10.1002/hep.31326>
6. Sun J, Aghemo A, Forner A, Valenti L. COVID-19 and liver disease. *Liver Int*. 2020;40(6):1278-1281.
7. Chen N, Zhou M, Dong X, et al. Epidemiological and clinical characteristics of 99 cases of 2019 novel coronavirus pneumonia in Wuhan, China: a descriptive study. *Lancet*. 2020;395(10223):507-513.
8. Zhang Y, Zheng L, Liu L, Zhao M, Xiao J, Zhao Q. Liver impairment in COVID-19 patients: a retrospective analysis of 115 cases from a single center in Wuhan city, China. *Liver Int*. 2020;40(9):2095-2103. <https://doi.org/10.1111/liv.14455>
9. Zhou F, Yu T, Du R, et al. Clinical course and risk factors for mortality of adult inpatients with COVID-19 in Wuhan, China: a retrospective cohort study. *Lancet*. 2020;395:1054-1062. [https://doi.org/10.1016/S0140-6736\(20\)30566-3](https://doi.org/10.1016/S0140-6736(20)30566-3)
10. Wang D, Hu B, Hu C, et al. Clinical characteristics of 138 hospitalized patients with 2019 novel Coronavirus–infected Pneumonia in Wuhan, China. *JAMA*. 2019;323(11):1061. <https://doi.org/10.1001/jama.2020.1585>
11. Xu XW, Wu XX, Jiang XG, et al. Clinical findings in a group of patients infected with the 2019 novel coronavirus (SARS-Cov-2) outside of Wuhan, China: retrospective case series. *BMJ*. 2020;368:m606. <https://doi.org/10.1136/bmj.m606>
12. Cao X. COVID-19: immunopathology and its implications for therapy. *Nat Rev Immunol*. 2020;20:269-270. <https://doi.org/10.1038/s41577-020-0308-3>
13. Chai X, Hu L, Zhang Y, et al. Specific ACE2 expression in cholangiocytes may cause liver damage after 2019-nCoV infection. *BioRxiv*. 2020. <https://doi.org/10.1101/2020.02.03.931766>
14. WHO. Hepatitis C. <https://www.who.int/news-room/fact-sheets/detail/hepatitis-c>; 2020. Accessed November 4, 2021.
15. Castro VOL, Kamili S, Forbi JC, et al. High prevalence of Hepatitis C Virus infection among people who use crack cocaine in an important international drug trafficking route in Central-West Region Brazil. *Infect Genet Evol*. 2020;85:104488. <https://doi.org/10.1016/j.meegid.2020.104488>
16. do Nascimento CT, Pena DZ, Giuffrida R, et al. Prevalence and epidemiological characteristics of inmates diagnosed with infectious diseases living in a region with a high number of prisons in São Paulo state, Brazil. *BMJ Open*. 2020;10(9):e037045. <https://doi.org/10.1136/bmjopen-2020-037045>
17. Villar LM, Milagres FAP, Lampe E, et al. Determination of hepatitis B, C and D prevalence among urban and Amerindian populations from the Eastern Brazilian Amazon: a cross sectional study. *BMC Infect Dis*. 2018;18(1):411. <https://doi.org/10.1186/s12879-018-3279-2>
18. Ribeiro Barbosa J, Sousa Bezerra C, Carvalho-Costa F, et al. Cross-sectional study to determine the prevalence of hepatitis B and C virus infection in high risk groups in the Northeast Region of Brazil. *Int J Environ Res Public Health*. 2017;14(7):793. <https://doi.org/10.3390/ijerph14070793>
19. Kandeel M, Al-Nazawi M. Virtual screening and repurposing of FDA approved drugs against COVID-19 main protease. *Life Sci*. 2020;251:117627.
20. Aldhaleei WA, Alnuaimi A, Bhagavathula AS. COVID-19 induced hepatitis B virus reactivation: a novel case from the United Arab Emirates. *Cureus*. 2020;12(6):e8645. <https://doi.org/10.7759/cureus.8645>
21. Ali E, Zigliam H, Kohla S, Ahmed M, Yassin M. A case of fulminant liver failure in a 24-year-old man with coinfection with hepatitis B virus and SARS- CoV-2. *Am J Case Rep*. 2020;13(21):e925932. <https://doi.org/10.12659/AJCR.925932>
22. Xu K, Chen Y, Yuan J, et al. Factors associated with prolonged viral RNA shedding in patients with COVID-19. *Clin Infect Dis*. 2020;71(15):799-806.
23. Penchenat A, Alavi Z, Payan C, Pers J-O. Prolonged 59 day course of COVID-19: the case of SARS-CoV-2 shedding persistence in a healthcare provider. *Clin Case Rep*. 2020;1-4.

How to cite this article: Villar LM, de Paula VS, Pinto LCM, et al. Clinical and laboratory characteristics of hepatitis C and COVID-19 coinfection: Prolonged RNA shedding in nonhospitalized case. *Clin Case Rep*. 2021;00:1–4. <https://doi.org/10.1002/ccr3.3877>