Journal of african clinical cases and reviews / Journal africain des cas cliniques et revues

www.jaccrafrica.com ISSN 2712-6412 Open access

JaccrInfectiology

Original article

Liver function abnormalities during SARS-CoV-2 infection and their prognostic value in disease progression

Anomalies de la biologie hépatique au cours de l'infection à SARS-CoV-2 et leur valeur pronostique dans l'évolution de la maladie

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Résumé

Introduction : Le COVID 19 est une pandémie mondiale déclarée par l'OMS le 30/01/2020. Le premier cas a été déclaré au Burundi le 31 Mars 2020. L'objectif de notre travail était d'étudier les anomalies du bilan hépatique au cours du SARS CoV2 et leur impact sur le pronostic de la maladie.

Méthodologie : Il s'agit d'une étude rétrospective mono centrique, descriptive et analytique qui s'est déroulée sur une période de 2 ans (2020-2021). Cette étude a porté sur 115 patients qui ont été hospitalisé à l'Hôpital BUMEREC.

Résultats : 155 patients avaient réalisé un bilan hépatique au cours de l'hospitalisation. L'âge moyen des patients étaient de 60 ans avec un intervalle entre 22 et 97 ans. La prédominance masculine avec 59,50% soit un sex ratio de 1,46. Les comorbidités les plus retrouvées étaient l'HTA et le diabète avec les taux respectifs de 31,30 % et 29,57%. Les signes cliniques les plus fréquents étaient : la toux, fièvre et asthénie avec des taux respectifs de 87,83%, 73,04%, 53,91%. 74,78% avaient une maladie légère à modéré et 25,22 % avaient une maladie sévère. Taux ASAT/ALAT> 2N, GGT>2N et PAL>1,5 N étaient respectivement de 43,47%, 20% et 9,57% des patients. L'aggravation clinique pendant l'hospitalisation était observée chez 41,74 % et la mortalité hospitalière était de 15,65%. Les moyennes respectives des ASAT, ALAT, GGT et PAL chez les patients décédés étaient de 118, 131, 118 et 289. Il existe un rapport statistiquement significatif entre la profondeur de la perturbation du bilan du bilan hépatique et la mortalité des patients.

Conclusion : Le COVID-19 est fréquemment associé à une légère perturbation du bilan hépatique. Les patients ayant une profonde anomalie de la biologie hépatique sont susceptibles d'évoluer vers une maladie grave.

Mots-clés : COVID 19 ; cytolyse ; cholestase, Burundi.

https://doi.org/10.70065/2572.jaccrInfect.003L013004

Abstract

Introduction: COVID 19 is a global pandemic declared by the WHO on 30/01/2020. The first case was declared in Burundi on 31 March 2020. The objective of our work was to study liver function abnormalities during SARS CoV2 and their impact on the prognosis of the disease.

Methodology: This is a retrospective, single-center, descriptive and analytical study that took place over a period of 2 years (2020-2021). This study involved 115 patients who were hospitalized at the BUMEREC Hospital.

Results: 155 patients had a liver test during hospitalization. The mean age of the patients was 60 years with an interval between 22 and 97 years. The male predominance with 59.50%, i.e. a sex ratio of 1.46. The most common comorbidities were hypertension and diabetes, with rates of 31.30% and 29.57% respectively. The most frequent clinical signs were: cough, fever and asthenia with respective rates of 87.83%, 73.04%, 53.91%. 74.78% had mild to moderate disease and 25.22% had severe disease. ASAT/ALT> 2N, GGT>2N and PAL>1.5 N levels were 43.47%, 20% and 9.57% of patients, respectively. Clinical worsening during hospitalization was observed in 41.74% and in-hospital mortality was 15.65%. The respective averages of AST, ALT, GGT, and PAL in deceased patients were 118, 131, 118, and 289. There is a statistically significant relationship between the depth of disruption in liver work-up and patient mortality.

Conclusion: COVID-19 is frequently associated with a mild disruption of liver work. Patients with a profound abnormality in liver biology are likely to progress to serious disease.

Keywords: COVID 19; cytolysis; cholestasis, Burundi.

Introduction

COVID-19 (Coronavirus Disease 2019) is a viral disease secondary to infection by a virus belonging to the coronaviridae family, discovered at the end of December 2019 in the city of Wuhan in China. It is commonly referred to as SARS-CoV-2 (Severe Acute Respiratory Syndrome CoronaVirus2). [1,2]

The World Health Organization (WHO) declared the SARS-CoV-2 pandemic a public health emergency of international concern on 30/01/2020. Then, after rapid spread and acceleration of cases worldwide, the WHO officially declared the COVID-19 epidemic a pandemic on March 11, 2020 [3,4].

Burundi, like the rest of the world, has been confronted with the spread of this pathology. At the end of March 2020, the first cases of contamination were recorded in Burundi. These were imported cases [5].

If respiratory symptoms are in the foreground, digestive manifestations can be observed as well as liver test abnormalities, described in quite a few studies carried out in Morocco, France, China and elsewhere [6, 7, 8].

In our study, we retrospectively studied liver function abnormalities in infected patients hospitalized at BUMEREC Hospital in Burundi. Our objective was to study liver biology abnormalities during SARS CoV2 infection and their impact on the prognosis of the disease.

Methodology

This is a retrospective, single-center, descriptive, and analytical study that took place over a period of 2 years (2020-2021).

Patients aged 18 years and older hospitalized for a SARS-CoV-2 infection confirmed at the BUMEREC Hospital and with a positive diagnosis of COVID-19 confirmed by an RT-PCR (Reverse transcription polymerase chain reaction) or a rapid test were included.

Liver biology was assessed by monitoring alanine aminotransferase (ALT), aspartate aminotransferase (AST), gamma glutamyltransferase (GGT), and alkaline phosphatase (ALP). Abnormal liver biology was defined as values greater than 2 times the upper limit of normal (ULN) for AST, ALT, and GGT and 1.5 times the ULN for PALs. The cytolytic profile refers

https://doi.org/10.70065/2572.jaccrInfect.003L013004

to abnormal levels of AST or ALT, and the cholestatic profile refers to abnormal levels of GGT and PAL. Liver biology values are expressed in International Units per Liter (IU/L)

Severity was assessed according to the Burundi national protocol and based on ambient air SaO2 (Mild >95%, moderate 90-95%, severe <90%) which is an easily assessable parameter; with or without association with sepsis and/or septic shock.

The worsening of the disease was assessed by visceral failure during hospitalization, requiring or not a transfer to intensive care.

All patients with pre-existing liver disease were excluded.

The data was captured and analyzed by Epi Info version 7 and R version 4 software. The materiality threshold was set at $p<0.05$.

Results

During this study period, 115 patients, with at least one liver biology for the duration of their hospitalization, with a complete file, whose COVID-19 was confirmed by PCR or rapid test.

- Patient characteristics

Male was predominant at 59.50% with a sex ratio of 1.46. The median age was 60 years; with extremes between 22 and 97 years old. High blood pressure (hypertension) and diabetes were the most represented comorbidities at 31.30% and 29.57% respectively. 44 patients (38.26%) had the mild form of the disease, 36.52% the moderate form and 25.22% the severe form. 41.74% of patients had a worsening of the disease during their hospitalizations. Hospital mortality was 15.65%.

- Abnormalities in liver biology and analysis

Descriptively, of the 115 patients, a high level of AST was the most represented disturbance in 43.47%; followed by ALAT at 31.30%, GGT at 20% and PALs at 9.57%.

The results of the liver biology for all our patients had shown mean values of AST, ALT, GGT, PAL respectively at 67; 68; 82 and 191 IU/L.

In the group of patients where the involvement was classified as mild, with the mean AST, ALT, GGT and PAL were respectively 41; 38; 54 and 150 IU/L.

A profound abnormality in hepatic biology was noted in patients with severe impairment with mean of AST, ALT, GGT and PAL, respectively, at 114, 131, 138 and 268 IU/L. The relationship between liver biology abnormality and disease severity was statistically significant with a p-value <0.001.

In the group of recovered patients, the average of AST, ALT, GGT and PAL was 57, respectively; 57; 76 and 173 IU/L; A profound abnormality in liver biology was noted in patients who died with mean of AST, ALT, GGT and PAL, respectively, at 121, 131, 118 and 289 IU/L. There is a statistically significant relationship between the depth of cytolysis (AST and ALT) and mortality with p-value <0.001. The ratio between mortality and cholestasis depth (GGT and PAL) is also statistically significant with a p-value of 0.040 for GGT and 0.024 for PAL.

Discussion

- Constraints and limitations of the study

Hepatic biology was not often performed on admission but during hospitalization and for some patients only in cases of clinical severity

- Patient characteristics

Male was predominant 59.50% of patients with a sex ratio of 1.46. Niyongabo and Al.au Burundi in 2020, Irakoze et al. in Burundi in 2023 and Bah et al. in Mali in 2023 had found a male predominance with a sex ratio of 2.43, 2.04 and 1.12 respectively [9, 10,11].

The median age was 60 years, ranging from 22 to 97 years. Chaibi and Bah found the median age of 60 years, Niyongabo et al. found 56.3 years, and Daoui et al. found 51 years.

The most common comorbidities were hypertension and diabetes in 31.30% and 29.57% of cases, respectively. Daoui et al in Morocco had found diabetes and hypertension in 22.14% and 18.12% of cases respectively [12]. In the series by Niyongabo et al., diabetes and hypertension accounted for 52.7%

https://doi.org/10.70065/2572.jaccrInfect.003L013004

and 25.4% of cases, respectively [9]. Irakoze et al. found hypertension in 30.71% and diabetes in 25.71% of cases and Chaibi et al. found hypertension and diabetes in 45.6% and 29.5% of cases, respectively [6, 10].

In our series, 74.78% had the mild to moderate form of the disease, and 25.22% the severe form. Qingxian et al. in China found in their series that 21.8% had developed severe disease and 78.2% had experienced mild illness during their hospitalization [8]. Saïdi et al. in Morocco had found in their series a mild and moderate impairment of 86.2% and 13.8% of severe impairment [7].

Hospital mortality was 15.70% in our series. Chaibi et al. in France and Niyongabo et al in Burundi found hospital mortality in 16% and 12.7% of cases, respectively [6, 9].

- Abnormality of hepatic biology and analysis

Abnormal AST/ALT was found in 43.47% of cases. Chaibi et al. in France found AST/ALT abnormalities in 24.3% of cases[11]. Qingxian et al. found transaminase abnormalities in 24% and Edoardo et al. found transaminase abnormalities in 26.7% of cases [8, 13]. GGT was abnormal in 20% of cases. Chaibi et al. in France found an abnormality in GGT in 25.3% of cases [6]; Edoardo Vespa et al. in China found an abnormality in GGT in 36.2% of cases.

In our series, 9.57% of patients had a higher than normal PAL level. Edoardo Vespa et al. elevated alkaline phosphatase levels were found in 9.6% of patients.

There is a statistically significant relationship (p-value < 0.05) between the depth of liver biology abnormality and the severity of disease and death. Patients who had severe COVID, worsening during hospitalization or death had the mean of AST, ALT, GGT very high compared to the overall average. The same finding has been observed in other studies.

Chao et al. found that patients with severe COVID-19 appeared to have higher rates of liver dysfunction [14].

A study by Cai et al. found that patients with abnormal liver tests had a significantly higher risk of developing severe pneumonia [8].

Chaibi et al. had shown in their study that high levels of ALT or AST were associated with more severe disease [6].

Conclusion

Our series showed that there is an abnormality in liver biology during SARS-COV2 infection with cytolysis predominant compared to cholestasis. There is a statistically significant relationship between the depth of the liver biology abnormality and the severity of the disease as well as the prognosis.

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Available online : April 30, 2025

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Conflict of interest : None

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To cite this article

M Amani, M Manirakiza, B Kagorore, JB Ngomirakiza. Liver function abnormalities during SARS-CoV-2 infection and their prognostic value in disease progression. Jaccr Infectiology 2025; 7(2): 15-19

https://doi.org/10.70065/2572.jaccrInfect.003L013004