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PYOGENIC LIVER ABSCESS AS AN IMMEDIATE POST COVID-19 COMPLICATION

Introduction

Since the beginning of the COVID-19 pandemic in 2019, doctors were forced to battle a wide range of post infection complications as a result of the damage done by the SARS-CoV-2 virus within the human body. Initially known as a respiratory disease, COVID-19 is now proven to have systemic infectious and inflammatory effects as well that lead to multiorgan effects [3]. The gastrointestinal system is most commonly affected with its signs and symptoms frequently found in COVID-19 patients. Hepatobiliary complications are highly unusual. One such unusual post-infection complication is the formation of pyogenic liver abscess. A pyogenic liver abscess is an infectious space occupying lesion filled with pus within the liver which causes a variety of symptoms from mild malaise and fatigue lasting from several days to months to showing signs of right hypochondriac pain accompanied by fever, chills, vomiting and weight loss. It has an annual incidence rate of about 2.3 cases per 100,000 individuals with males more affected than females in a ratio of 1.5:1 [2]. An increased incidence is seen in the elderly population ranging from 40-50 years old, diabetics and within individuals who are immunocompromised. Pyogenic liver abscesses that form as a consequence of COVID-19 often go unnoticed and neglected, contributing to the high mortality in patients.

Goal

This article reviews several cases of pyogenic liver abscess occurring as an immediate post complication of COVID-19 and aims to help understand the link and any possible underlying

theories that will connect the two conditions which will help in recognizing early signs and strive for timely and effective treatment.

Material and Methods of research

For this article we gathered and analyzed several case studies of patients who suffered from pyogenic liver abscess as a complication of COVID-19 within the past 2 years, concentrating more on the clinical signs, laboratory and instrumental results. Case studies of particular importance aided us to come to suggestive theories included those from PubMed, The National Library of Medicine, ScienceDirect and WHO COVID-19 Research Database. We were able to come to a general overview about the topic using two Indian based articles, one by NDTV and The Hindu. A special mention should be given to a case of pyogenic liver abscess following COVID-19 present within the database of the Gomel Regional Clinical Hospital.

Research results and discussion

A particular case was recorded in Gomel involving the admission of a 23-year-old female patient D. admitted on 21/02/2022 with a period of stay till 12/04/2022 with the formation of a liver abscess along with COVID-19 infection of moderate form complicated with bilateral pneumonia of viral-bacterial etiology, systemic inflammatory response syndrome, right sided reactive pleuritis and respiratory failure type 1. On admission the patient complained of pain in the right hypochondrium which increased with cough, weakness, nausea and a body temperature of 40 °C. Previously, she was hospitalized and discharged after a two day stay on a diagnosis of acute nonbacterial food poisoning with a negative Rapid Ag test SARS-CoV-2 virus. Three days later, her conditioned worsened and she was hospitalized once again. This time, her rapid Ag test SARS-CoV-2 virus was positive. Upon laboratory testing, leukocytosis, increased levels of ESR, APPT, CRP, LDH and D-dimer were noted. AST and ALT levels and serum bilirubin were normal. Chest CT showed signs of consolidation on the middle and inferior lobes of the right lung and on the inferior lobe of the left lung up to 18 mm providing evidence of pneumonia at the early stage. Hydrothorax was also noted, more on the right side. On CT of abdomen, hepatomegaly was seen with a large multilocular abscess, measuring 10 × 10 × 9 cm present on the right lobe of the liver occupying the 4^{th}, 5^{th} and 8^{th} segments with swelling of surrounding parenchyma. Splenomegaly noted as well. After a failed attempt of drainage of the liver abscess under ultrasound control, an exploratory laparotomy was done with sanitation and drainage of abscess. Thoracocentesis was performed. Patient was treated with Acetylsalicylic acid, Ketorolac, Acetylcysteine, Co-trimoxazole, Rivaroxaban, Etamsylate, Ambroxol, Analgin, Prednisolone, Papaverine, Diclofenac, Enoxaparin, Ciprofloxacin, Promedol, Vancomycin, Linezolid, Sulmagraf (Cefoperazone and Sulbactam), Imipenem with Cilastatin, Metranidazole and Fluconazole. Two weeks later, secondary sutures were applied followed by drainage of right subdiaphragmatic space. The patient's condition gradually improved. All laboratory parameters reached normal levels in a linear pattern and the patient was discharged with an occasional cough and subfebrile temperature rises.

A few theories have been brought to light suggestive about the hepatic pathophysiology connected with the infection.

The first theory concentrates around the cytokine storm that is triggered by the COVID-19 infection. It involves the uncontrolled release of pro inflammatory cytokines both locally and systematically, namely interleukin-6 (IL-6). IL-6 plays a major role in protection of the liver from infective agents and induces acute phase response to ischemia, reperfusions and toxins. More importantly, it is crucial in hepatocyte homeostasis and is a potent hepatocyte mitogen [5]. Excessive levels of IL-6 during a cytokine storm following a COVID-19 infection cause liver injury which leads to inflammation and eventually an abscess formation.

The second theory is suggestive of direct cytotoxicity of the liver from active viral replication following a period of severe systematic inflammatory response syndrome due to

the cytokine storm [4]. The SARS-CoV-2 virus enters the respiratory system via angiotensin converting enzyme 2 (ACE2) receptors. These receptors are also expressed by the liver.

The third theory is based around the possibility of Drug Induced Liver Injury (DILI). The patient is treated with a wide range of drugs, including acetylsalicylic acid and Diclofenac, which are hepatotoxic when used for long periods of time [8]. DILI that forms as a result may progress to an abscess.

A fourth theory is also put forth in relation with the hypoxic conditions formed in patients with severe COVID-19 infection due to the progression of acute respiratory distress syndrome. These patients may develop hypoxic hepatitis due to the reduced blood flow to the liver, venous congestion caused by right heart failure and arterial hypoxemia all of which combined decrease oxygen supply to the liver leading to liver damage and eventually an abscess [6].

The fifth theory is the hypercoagulable state of a COVID-19 infected patient which contributes to liver damage due to arterial and venous thrombotic complications. How this occurs is still under investigation, though some hypotheses have arisen pointing out the cytokine storm and direct viral cytotoxicity as the cause for endothelial cell dysfunction which causes excessive thrombin generation, thus a hypercoagulable state [7].

A sixth theory suggests that the formation of a pyogenic liver abscess maybe the result of a superinfection following initial infection with the SARS-CoV-2 virus. The superinfection may be caused by pyogenic bacteria such as Escherichia coli, Streptococcus milleri and anaerobic forms like bacteriodes. Other forms include Klebsiella pneumonia, Enterococcus faecalis, Proteus vulgaris, Staphylococcus aureus and Pseudomonas aeruginosa [1, 4].

Conclusion

In conclusion, we can state that the pathological mechanisms occurring within the liver post COVID-19 are alarming and often go unnoticed. Patients who are not acutely ill, usually are diagnosed as 'pyrexia of unknown origin' as almost all investigations are normal. AST, ALT levels increase remarkably only during the end stage. It contributes to the increased mortality and a poor prognosis of patients due to late diagnosis. To date, concrete evidence has not been found linking COVID-19 with hepatic involvement, but due to the rise in cases, it is crucial to monitor the liver in all patients with the infection for early diagnosis and appropriate safe and timely treatment to prevent and inhibit pathological mechanisms of liver damage.

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