Severe Acute Hepatitis B, Caused by High Viral Load: A Case Report

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Abstract- Acute hepatitis B cases with very high viral load are rare in communities. This study presents an experience of treating a patient suffering from severe acute hepatitis B with a very high viral load. A 38-year-old Iranian male was diagnosed with acute hepatitis B with early and progressive liver dysfunction and a very high viral load. Treatment with Tenofovir was started. The complete response to treatment was achieved with multidisciplinary management; the patient was discharged after a week. A history of not being vaccinated against the hepatitis B virus and the job conditions could be the main causes of increased risks for his illness. However, the high viral load can be considered as the cause of severe acute hepatitis B development. The prompt and accurate diagnosis followed by suitable treatment choice led to the most favorable outcome.

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Introduction

Hepatitis B could cause acute or chronic infection. Acute hepatitis B is a short-term illness that occurs within the first 6 months after exposure to the hepatitis B virus. The incidence of severe acute hepatitis B is poorly described. In a study on Norwegian reported cases of hepatitis B, the annual incidence rates of acute hepatitis B between 1992-2009 were reported from 0.7/100,000 (1992) to 10.6/100,000 (1999). It also showed a rising trend in 2003 (17.6/100,000) and 2009 (17.4/100,000) (1). Nonetheless, the annual incidence of acute hepatitis B during the past 2 decades in the United States has been declined by 78%, from 232,000 to 51,000 cases (2).

Acute hepatitis B is frequently asymptomatic but could show symptoms such as fatigue, fever, and poor appetite as well as nausea, vomiting, abdominal pain, dark urine, changes in stool color, jaundice, headache, malaise, anorexia, diarrhea, and elevated serum alanine aminotransferase (ALT) levels. Laboratory criteria for the diagnosis of this disease are both of hepatitis B surface antigen (HBsAg)-positive or immunoglobulin M (IgM) antibody to hepatitis B core antigen (IgM anti-HBc) positive (3,4).

Case Report

The patient was a 38-year-old Iranian male soldier (border guard). He was referred because of weakness, lethargy, and yellow eyes since 7 days before. He had nausea, vomiting, and food intolerance. His history was negative for any major illness, alcohol and drugs abuse. He claimed that he had not been vaccinated for hepatitis B; he denied any unprotected sexual contact. At the time of admission, the patient was ill but did not have a fever (BP: 105/57 mmHg, PR: 89, RR: 16, T: 37.3° C); the examination showed frank jaundice. No hepatomegaly, splenomegaly, flapping tremor, sleep, or abdominal ascites were observed. He had no symptoms of CNS and encephalopathy. Initial studies at the residence showed changes in liver enzymes and increased coagulation factors (AST:820, ALT:453, PT:17.8, INR:1.33, Bili:11.9, plt:181000). Liver enzymes did not increase significantly over the next days (Table 1). Autoimmune hepatitis, HCV, HIV, and COVID-19 evaluations were

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negative in para-clinical studies, but HBsAg and HBc-Ab (total and IgM) were positive. HB virus PCR test was positive with a high titer (620,725,735 copies/mL). High levels of AST (aspartate transaminase), ALT (alanine amino transaminase), alkaline phosphatase, and bilirubin confirmed the hepatocellular pattern of injury (Table 1).

Table 1. Patient's liver function tests progression

	Ast (U/L at 37° C)	Alt (U/L at 37° C)	AlkP (U/L at 37° C)	Bili-T (Mg/dl)	Bili-D (Mg/dl)	Pt (Sec)	INR (Sec)
Normal Range	**Adult:<31**	**Adult:<34**	**Up to 270**	**Adult: 0-2.0**	**Up to 0.3**	**Up to 13.5**	**Up to 1**
Day 1	820	453	353	11.9	6.0	17.8	1.33
Max	820	525	353	11.9	8.3	21.1	1.58
Day 14	422	20	293	9.3	5.5	17.5	1.31

The patient was treated symptomatically and antiviral therapy according to the Tenofovir protocol of 300 mg daily. He was discharged after one week in good general condition. The patient was advised to be monitored by a gastroenterologist or infectious disease specialist at the residence. It was recommended that antiviral hepatitis B drugs be discontinued after two consecutive steps of negative HBsAg.

Discussion

In compliance with previous reports, we observed rapid improvement of a severe acute hepatitis B with a very high viral load (VL) treated by Tenofovir. Utilizing the real-time polymerase chain reaction (qPCR), the HBV VL is quantified. It is also used to monitor disease progression and distinguish active HBeAg-negative disease from an inactive chronic infection. The VL test is beneficial in the decision-making of management or patient tracking in association with other factors, such as alanine aminotransferase (ALT), aspartate aminotransferase (AST)-to-Platelet Ratio Index (APRI), and liver fibrosis (5).

The rate of high VL is variable in different communities. For instance, the rate of patients with VL between 2000-20,000 IU/mL and more than 20,000 IU/mL in Nepal has been reported as 11.7% and 19.3%, respectively (5).

Iregbu *et al.*, reported that between their Nigerian HBV infected patients, 16.7% had the highest VL of 20,001- 1.7×10^8 IU/ml IU/mL (6). Ribeiro *et al.*, reported that the median of the viral load for acute patients has been 3.15-2.46 and for chronic patients, 2.90-2.47 $\log_{10}$ IU of HBV DNA/mL (1 IU/ml=5.6 copies/ml) (7). However, acute HBV infection with very high viral load is rarely reported such as the present case with 8.04 $\log_{10}$ IU of HBV DNA/mL (620725735 copies/ml, 110843881.25 IU/ml).

An acute hepatitis B may have a wide range of symptoms in variable degrees, and as like as our reported case, could be combined with more severe symptoms such as jaundice, nausea, and vomiting, which require hospitalization (8). The other characterization of acute hepatitis B, like what was seen in our patients, is the sudden elevation of serum ALT levels up to 10 times the upper limit of normal level (9). The causes of the disease can be considered a history of not being vaccinated against the hepatitis B virus and the job conditions (frequency of job missions to infected areas with low hygienic conditions). Occupational stress can also be a risk factor for weakened immune systems for the disease and high severity. High load of the virus can cause the disease to change from inactive to active. The main strategy for the treatment of these cases is intensive supportive care, including close monitoring and treatment of complications by managing symptoms and viral suppression with Lamivudine and Tenofovir. A delayed beginning of treatment could cause sudden liver failure and multi-organ dysfunction, which may raise the mortality risk rate (2). In our case, we also prescribed Tenofovir to suppress the virus and decrease complications. Preventing acute hepatitis B with vaccination is the best approach. The best result of HBV vaccine and the highest level of safety is observed in infants and toddlers. In the elderly, the immunization rate of this vaccine decreases.

There are no exact statistics on the frequency of vaccinations of the Iranian military. In a study by Alavian *et al.*, it was found that only a little over half of the staff of military health centers have received the full course of vaccination. Therefore, according to their job requirement, the risk of infection in this group of people

is very high (10).

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