

Case Report

Intra-familial transmission of hepatitis B affecting all household members A case report

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Abstract

Intra-familial transmission of hepatitis B is well documented and is the rationale for screening of household members. However, reports on transmission of infection to all household members are sparse. We report a case of intra-familial transmission of hepatitis B affecting all household members. The index case was a lady diagnosed with chronic liver cell disease, who was later found to have chronic hepatitis B viral infection. All household contacts were screened, which included five persons. All showed evidence of exposure and two were chronically infected, of which one was a pregnant lady. The risk of familial transmission of hepatitis B could be higher than expected. This case highlights the importance of active efforts to screen all family members at diagnosis of each new case of hepatitis B.

Keywords: Hepatitis, Sri Lanka, Familial, Transmission, Infection

Introduction

Hepatitis B is a partially double stranded DNA virus belonging to the family *Hepadnaviridae*. It is a leading cause of acute and chronic hepatitis in the world. However, in contrast to the regional epidemiology, Sri Lanka is considered to be a low-prevalent country for the infection.¹ The virus is transmitted through blood and blood products, percutaneous inoculation, sexual exposures, mother to child and horizontally through chronic exposure to infectious saliva.²

Diagnosis of hepatitis B infection is denoted by the presence of hepatitis B surface antigen (HBsAg).³ Chronic infection is determined by the presence of HBsAg for more than six months.³ Exposure to natural infection is determined by the presence of hepatitis B core antibodies (HBcAb). Presence of Hepatitis B envelope antigen (HBeAg) indicates a high replicative state and seroconversion to antiHBe reflects low infectivity.³

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Current recommendation for contact screening for hepatitis B infection is by testing for both HBsAg and HBcAb, or by initial testing for HBcAb, followed by HBsAg for all positive contacts.³ Although hepatitis B transmission could be as high as 11-57% among household contacts,^{4,5} infection of all family members in a single household is uncommon. We report a case of hepatitis B infection which occurred among all household members during routine contact screening of an index case.

Case Report

The index patient, a 53 year old female presented to the Teaching Hospital, Kandy with bilateral ankle swelling and abdominal distention of 1 week duration. She was diagnosed with chronic liver cell disease with a Child and Pugh score C and MELD (Model for End-stage Liver Disease) B. She was positive for HBsAg, HBcAb and HBeAg without evidence of HBeAb. Her initial viral DNA load was 3.2×10^3 IU/ml. Alanine transferase was elevated more than ten times the upper limit of normal. The patient was managed with a liver failure regimen and was started on the antiviral, tenofovir disoproxil fumarate. The family was referred to the Department of Virology for screening.

The household members included the patient's husband, three daughters and an elder sister who had been living in the same house for three years.

All household members were screened for both HBsAg and HBcAb. All were positive for HBcAb with two having detectable HBsAg. The contacts who were HBsAg positive were the patient's eldest daughter and sister (Figure 1). The contacts who were HBsAg negative had immunity against the infection with HBsAb levels >400 IU/ml and no further action was taken. They were educated about the past infection and the need to reveal this information at healthcare checks.

Both newly diagnosed HBsAg positive patients were negative for HBeAg and positive for HBeAb.

The patient's eldest daughter who was newly diagnosed, was married and undergoing assisted reproductive treatment (ART) by the time she was diagnosed. Her husband was negative for all markers and an accelerated hepatitis B immunization schedule was commenced for him. It was suggested to postpone pregnancy until her hepatitis B status was fully evaluated and controlled. However, she became pregnant before any further investigations/management could be done. Her hepatitis B DNA was undetectable, and it was planned to repeat the test at mid-trimester. She was directed to the care of a gastroenterologist.

The index patient's sister's viral load was found to be 5.1×10^3 IU/ml. She was asymptomatic at the time of diagnosis and was referred to the gastroenterologist for further management.

Discussion

Intra-familial transmission of hepatitis B is an important infection control issue. All healthcare providers need to play an active role in encouraging contacts to be screened. In this instance all household members had acquired the infection by the time of presentation of the index case.

It is possible that both the index patient and her sister acquired the infection congenitally as both of them were chronically infected. Congenital hepatitis B can cause chronic infection in up to 90% of patients.² We could not pursue this any further as both parents and all other siblings were not alive. As all children of the index patient were infected it is possible that they too acquired the infection perinatally. It is also possible that some family members acquired the infection through horizontal transmission, especially the two younger daughters, who did not have detectable HBsAg. Although horizontal transmission is well described in families,⁶ it is primarily observed among children in hyperendemic areas.^{7,8}

It is demonstrated that only <5% will develop chronicity if the infection is acquired during adulthood compared to 80-90% in perinatal infections.² Those patients who clear the HBsAg will develop protective immunity as in the case of these contacts. This is also true for the husband who had probably acquired the infection through sexual transmission.

Management of hepatitis B in pregnancy plays an important role in prevention of mother to child transmission. Current guidelines recommend administration of Hepatitis B vaccine to newborns of HBsAg positive mothers with or without Hepatitis B immunoglobulin, depending on the infectivity of the mother, within 12 hours of birth.^{2,7,9} Antiviral therapy in the second trimester is recommended for mothers with DNA load >200,000 IU/mL even if they do not meet the routine treatment indications, as a measure to prevent mother-to-child transmission.³ The pregnant mother in this case was detected in very early stages of her precious pregnancy and she was linked to the relevant care team for further management.

We also detected the patient's sister as a new case of chronic hepatitis. Knowing the hepatitis B exposure status will be important to other contacts as well, especially as there is a possibility of reactivation of the virus during cancer chemotherapy or immunosuppression as the virus is never completely cleared from the body.

The strength of this case was that it was possible to screen all household members of the index case. This case could have been further benefited by genetic sequencing and phylogenetic analysis in proving the routes of transmission and to determine any enhanced infectivity of the virus.

Conclusion

Transmission dynamics among household contacts is complex. Screening all contacts of the index patient is an essential part of infection control in the community and individual patient management as illustrated by this case.

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