Hepatitis: Review Questions

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QUESTIONS

Choose the single best answer for each question.

1. A 33-year-old man presents to a travel clinic for evaluation prior to a planned trip to India in 2 weeks. He is travelling to a rural part of southern India and will live in a small village, eating native food. How should this patient be advised regarding vaccination for hepatitis A?

(A) Vaccination is not necessary
(B) The patient should receive 2 doses of inactivated hepatitis A vaccine prior to travel
(C) The patient can travel after 1 dose of hepatitis A vaccine
(D) The patient should receive the first dose of hepatitis A vaccine and a dose of immunoglobulin (IG)

2. Hepatitis A vaccine is recommended in all of the following groups EXCEPT

(A) Children prior to 1 year of age
(B) Day care providers
(C) Food handlers
(D) Men who have sex with men
(E) Travelers to an endemic area

3. A 45-year-old day care provider presents to her physician's office with fever, nausea, malaise, and fatigue. On examination, she is icteric and has right upper quadrant tenderness and hepatomegaly. Serologic testing is positive for hepatitis A IgM antibody. The patient is responsible for the care of several toddlers. Following receipt of this information, the health care department should do which of the following?

(A) Administer IG to all previously unvaccinated staff and day care attendees
(B) Immediately administer ribavirin to staff and children who were in contact with the index patient
(C) Inform staff and parents that no further action is necessary except quarantining the affected employee
(D) Vaccinate all employees and recommend vaccination of all children attending the day care center

4. All of the following groups of people should be screened for the presence of hepatitis C virus (HCV) antibodies EXCEPT

(A) Intravenous (IV) drug users including those with a remote history of IV drug use
(B) Persons with HIV
(C) Persons with hemophilia who received clotting factor concentrates before 1987
(D) Persons who received blood or blood products after 1992
(E) Sexual partners of HCV-infected patients

5. All of the following statements regarding HCV are correct EXCEPT

(A) It is a positive, single-stranded RNA flavivirus
(B) It produces 12 trillion virions per day
(C) It replicates in hepatocytes
(D) HIV is more genetically diverse than HCV
(E) HCV enters the cell through the low-density lipoprotein and CD81 receptors

6. All of the following statements regarding hepatitis G virus (HGV)/GB virus-C (GBV-C) are correct EXCEPT

(A) HGV/GBV-C is an RNA virus belonging to the Flaviviridae family
(B) HGV/GBV-C is spread predominantly through parenteral routes
(C) HIV-positive patients coinfected with HGV/GBV-C have improved survival as compared with patients with HIV alone
(D) Patients with HCV and a coexisting HGV/GBV-C infection have a clinically more severe course of illness than those with HCV alone

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Questions 7 and 8 refer to the following case.

A 33-year-old man with a history of hypertension, diabetes mellitus, and HCV diagnosed 2 years ago presents to his primary care physician with a 2-week history of increasing fatigue and bilateral knee pain. On examination, he is afebrile with stable vital signs. There is no knee joint warmth or effusion; however, a small, raised, reddish-purple rash is noted on the lower extremities bilaterally. Laboratory studies reveal an elevated serum creatinine level (2.0 mg/dL) and a low serum complement level.

7. What is this patient's most likely diagnosis?

(A) Acute hypersensitivity reaction
(B) Bilateral lower extremity cellulitis
(C) Essential mixed cryoglobulinemia (EMC)
(D) Insect bites
(E) Rocky Mountain spotted fever

8. What is the next step in the treatment of this patient?

(A) Diphenhydramine and IV methylprednisolone
(B) Doxycycline
(C) IV cefazolin
(D) Pegylated interferon
(E) Topical corticosteroid

ANSWERS AND EXPLANATIONS

1. (D) The patient should receive the first dose of hepatitis A vaccine and a dose of IG. Hepatitis A virus (HAV) is endemic in India, and the risk of acquiring the virus is higher among travelers staying in areas with poor hygienic conditions, such as small, rural villages. Hence, this patient should be vaccinated prior to his planned trip. Inactivated hepatitis A vaccine is safe and immunogenic. The vaccine is usually administered as a single dose followed by a booster dose 6 to 12 months later. Ideally, patients should receive both doses of the vaccine (6 months apart) prior to travel. If this is not feasible, patients should receive at least 1 dose of the vaccine 4 weeks before travel to have a significant antibody response, with the second dose completed 6 to 12 months later. Patients planning a trip to a country of high endemicity sooner than 4 weeks after the first dose of vaccine should also receive a dose of intramuscular IG at a different injection site.[1]

2. (A) Children prior to 1 year of age. Hepatitis A vaccine is an inactivated vaccine that should be administered intramuscularly (IM) into the deltoid muscle. The most common adverse effect of the vaccine is local injection site soreness, and serious adverse events are very rare. Based on the updated 2006 recommendations from the Advisory Committee on Immunization Practices, all children should be vaccinated for hepatitis A at age 1 year (ie, age, 12–23 mo).[1] Hepatitis A vaccination should be integrated into the routine childhood vaccination schedule. Children who are not vaccinated by age 2 years can be vaccinated at subsequent visits. Vaccination for hepatitis A is also recommended for the following groups: travelers to endemic areas, persons with chronic liver diseases, users of injection and noninjection illicit drugs, men who have sex with men, persons with occupational risk of infections (primate handlers, people working with HAV in a research setting), and persons with clotting factor disorders.[1]

3. (A) Administer IG to all previously unvaccinated staff and day care attendees. In the case of HAV infection in a day care employee or attendee, IG should be administered to all previously unvaccinated staff and attendees of the day care center. IG also should be considered for employees or households of day care attendees that have children in diapers. IG provides protection against HAV through passive transfer of antibody. IG, either administered IM or intravenously, contains anti-HAV, but IG administered IM is used for the prevention of HAV infection. Poor hygiene among children who wear diapers and the handling and changing of diapers by staff contribute to the spread of HAV infection in day care centers. When administered within 2 weeks after exposure to HAV (0.02 mL/kg IM), IG is 80% to 90% effective in preventing HAV infection.[1] IG is more efficacious when administered early in the incubation period; when administered later in the incubation period, IG may only attenuate the clinical expression of HAV infection. The hepatitis A vaccine may be administered at the same time as IG for unvaccinated children and staff members receiving postexposure prophylaxis in day care centers. Ribavirin is used in the treatment of HCV infection, not HAV infection.

4. (D) Persons who received blood or blood products after 1992. Persons are not considered at risk for HCV unless they received the blood transfusion prior to 1992. Therefore, persons who received blood/blood products after this time should not be screened for HCV antibodies.[2,3] All of the remaining groups of persons have risk factors for the acquisition of HCV and should be screened for the presence of HCV

antibodies. Other groups that should be screened for the presence of HCV antibodies include children born to mothers with HCV, anyone receiving an organ transplant before 1992, health care workers after a needlestick injury or mucosal exposure to hepatitis C–positive blood products, persons who have ever been on hemodialysis, and persons with unexplained elevations of aminotransferase levels.[4]

5. **(D) HIV is more genetically diverse than HCV.** Hepatitis C is an RNA virus belonging to the family Flaviviridae and has tropism for hepatocytes. HCV enters the cell through the low-density lipoprotein and CD81 receptors. When viral RNA invades the host cell, it then serves as messenger RNA and rapidly produces new virions, up to 12 trillion per day. In comparison, HIV produces approximately 10 trillion virions per day. Hence, HCV is more genetically diverse than HIV, which is a major reason for the lack of an effective HCV vaccine.

6. **(D) Patients with HCV and a coexisting HGV/GBV-C infection have a clinically more severe course of illness than those with HCV alone.** HGV and GBV-C have a greater than 95% global sequence and amino acid homology.[5] HGV/GBV-C is a single-stranded, positive-sense RNA virus and is considered a new genus within the Flaviviridae family. Studies have consistently shown the lack of influence of HGV/GBV-C on the clinical, biochemical, histologic, and virologic course of coexistent HCV infection.[5] Unexpectedly, several studies have shown that HIV-infected patients who are coinfected with HGV/GBV-C fare better in terms of overall survival, interval to development of AIDS, and duration of survival after the onset of AIDS.[5] The exact mechanism for this phenomenon remains unclear.

7. **(C) EMC.** HCV infection has been found in most patients with EMC. Symptomatic cryoglobulinemia is mediated by the deposition of antigen-antibody complexes in small- and medium-sized arteries. Clinical manifestations of mixed cryoglobulinemia include palpable purpura (which is suggestive of vasculitis), nonspecific systemic symptoms (eg, myalgias, fatigue), arthralgias, lymphadenopathy, hepatosplenomegaly, peripheral neuropathy, and hypocomplementemia (often demonstrated by a decrease in C4 levels). Renal disease is present in a large number of patients with EMC; renal manifestations include hematuria, acute and chronic renal failure, and nephritic syndrome. A diagnosis of mixed cryoglobulinemia is typically made from the history, presence of skin purpura, and low complement levels and circulating cryoglobulins found on laboratory testing. This patient has no history of exposure to a new drug or environmental agent to suggest a diagnosis of an acute hypersensitivity reaction or insect bite. The physical examination findings are not compatible with cellulitis. Neither cellulitis nor an acute hypersensitivity reaction would explain the laboratory abnormalities in this patient. There is no history of travel to an area endemic for Rocky Mountain spotted fever, and the 2-week history of slowly progressive symptoms and the lack of systemic toxicity rule against Rocky Mountain spotted fever.

8. **(D) Pegylated interferon.** EMC, also called type II cryoglobulinemia, is often induced by HCV infection. For a progressive systemic disease such as EMC, active therapy with pegylated interferon is indicated. Plasmapheresis is a therapeutic option in patients with acute severe disease. Therapy for hepatitis C, including combination therapy with pegylated interferon and ribavirin, has been shown to be beneficial in patients with EMC; however, patients may experience disease recurrence following completion of therapy. Ribavirin is contraindicated in the setting of renal insufficiency, but it has been used successfully in low doses in patients with mild to moderate renal insufficiency.[6]

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