

Viral Hepatitis

1.0 Contact Hour

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Viral Hepatitis

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Objectives:

1. Define the term “hepatitis” and the differences between “acute hepatitis” and “chronic hepatitis”.
2. List the five types of hepatitis viruses and which are most common.
3. List the functions of the liver.
4. Describe how the hepatitis virus damages or destroys the liver.
5. Describe the therapies presently available for the treatment of the most common forms of hepatitis.

Introduction

Hepatitis is an inflammatory and infectious disease process of the liver that can be caused by viruses, chemicals, drugs, alcohol, inherited diseases or the patient’s own immune system. This inflammation can be acute, flaring up and then resolving within a few weeks to months, or it can become chronic, enduring over many years. Chronic hepatitis may simmer for 20-or-more years before causing significant symptoms related to progressive liver damage such as cirrhosis (scarring and loss of function), liver cancer or death.

The most common viruses that affect the liver are hepatitis A virus (HAV), hepatitis B virus (HBV) and the hepatitis C virus (HCV). There are also two much less common viruses, hepatitis D virus (HDV) and hepatitis E virus (HEV). Infection can vary from asymptomatic to fulminate disease.

Functions of the liver

The liver is a vital organ of the body, performing over 500 functions essential to the proper functioning needed to maintain good health. It is a major center of metabolism, which may be defined as the physical and chemical process whereby foodstuffs are synthesized into complex elements and where complex substances are transformed into simple ones. The liver is responsible for converting food into energy, and also stores sugar, fats, and certain vitamins for later use. It is also a center of detoxification, processing, filtering, and eliminating foreign chemicals such as drugs, alcohol and the waste products of metabolism. The liver eliminates these waste products from the body via its excretory product (bile) which also plays an important role in digesting and absorbing fats and other nutrients. The liver also produces many important proteins and hormones, and is important in manufacturing substances that assist in the clotting of blood.

As the blood leaves the stomach and intestines, it passes through the liver, which breaks down nutrients for use by the rest of the body. In addition to bile, the liver also manufactures proteins such as albumin that is part of blood plasma; albumin is an important transport medium for many of the molecules the body needs for homeostasis. The liver functions as a major site for conversion of dietary sugars into glucose, which is released into the bloodstream for energy requirements. Excess glucose is then converted by the liver into glycogen for storage which later can be converted back to glucose for energy. The liver is also responsible for bilirubin detoxification and the processing of hemoglobin for which the liver stores to use as needed. Resisting infections by producing immune factors and removing bacteria from the blood are also functions of the liver.

Ammonium, a toxic product of nitrogen metabolism, is converted to nontoxic urea in the liver. Urea is one of the end products of protein metabolism that is eliminated from the body by the kidneys and excreted in the urine. The liver is the principal source of proteins necessary for blood coagulation, including fibrinogen and prothrombin which regulate the process of blood clotting.

Pathology of hepatitis

The mechanisms-of-action of hepatitis A, B and C are not clear; however, it is known that the viruses damage the hepatocytes, the functional units of the liver. The hepatocytes are damaged in one of two ways: the direct action of the virus, as with HCV, or through a cell-mediated response as with HBV. Depending on the severity of the inflammation and damage to the hepatocytes, the hepatocytes may regenerate or fibrous scar tissue may develop. Chronic inflammation is described as persistent inflammation of six months or longer; this may lead to permanent fibrosis and cirrhosis as well as an increased incidence of hepatocellular carcinoma.¹

Hepatitis A

Hepatitis A affects 1.4 million people annually worldwide.² About 22,700 cases of hepatitis A, representing 38% of all hepatitis cases, (5-year average from all routes of transmission) are reported annually in the U.S.³ HAV infection is acute, but self-limiting, with fulminate disease being rare.¹

Hepatitis A is spread through infected water and food that have been contaminated with fecal material. Infection in childhood usually provides an immunity to fulminate infection in adulthood. Most individuals 18 and older demonstrate an immunity that provides lifelong protection against reinfection. In the U.S., the percentage of adults with immunity increases with age (10% for those 18-19 years of age to 65% for those over 50).³ Symptoms may be flu-like and are frequently not identified as being due to hepatitis, with most patients recovering fully within about six months. The incidence of HAV infection has been slowly decreasing due to the increasing use of the HAV immunization.⁴

Treatment of HAV infection is symptomatic. Rest is recommended during the acute phase. Acetaminophen, alcohol and other hepatotoxic substances should be avoided in patients with HAV.

Hepatitis B

Hepatitis B is the most common cause of acute viral hepatitis. HBV is responsible for almost 80% of primary hepatocellular carcinoma cases. Approximately 400 million people worldwide are infected with HBV with an estimated 1.2 million living in the United States.⁵ The highest incidence of infection is found in those aged 20-49. Death occurs in 15% - 25% of those chronically infected.⁶ HCV spreads through contact with infected bodily fluids such as by exposure to blood, infected needles, through sexual relations, and from mother to baby.

The incubation period ranges from 45 – 180 days, with most patients being asymptomatic during this period. Most patients demonstrate no abnormal findings on physical examination; those with

advanced disease may present with jaundice, ascites, splenomegaly, muscle wasting and gynecomastia.¹

The hepatitis B surface antigen (HBsAg) is the first laboratory test to be abnormal, with levels increasing two-to-six weeks after exposure. Levels then decrease and become undetectable one-to-three months after the initial peak. If the HBsAg persists, then chronic infection has developed.¹ The hepatitis surface antibody (HBsAb) is used to determine immunity – a positive HBsAb indicates immunity through previous infection or immunization. Antibodies appear several weeks to several months after the disappearance of HBsAg, and remain elevated for life.¹

Treatment of HBV is difficult at best. Interferon is the first-line treatment for chronic active HBV infection. Interferon acts by suppressing the virus while activating a T-lymphocyte response.¹ Side effects of treatment with interferon are significant. Flu-like symptoms and myalgias can be severe. Other side effects may include fatigue due to anemia, fevers and debilitating headaches. Psychological effects, such as depression, psychosis, violent behavior and aggression are not uncommon.⁷

Hepatitis C

As with HBV, HCV is a fluid or blood-borne pathogen. An estimated 4.1 Americans are infected with HCV, of whom 3.2 million are chronically infected. Most cases of new infection are due to the illegal injection of drugs. Hepatitis C is the leading indication for liver transplant.⁸

The incubation period of HCV ranges from 60-to-150 days; however, it may take up to six months for infection by the virus to be detectable by laboratory tests. About 80% of newly-infected individuals develop chronic infection; of these, 10%-to-20% develop cirrhosis.⁹ The most common complaints are fatigue, jaundice, anorexia, nausea and weight loss. Right upper quadrant pain and dark urine may also be present.¹

The most sensitive test for the diagnosis of HCV is the third-generation enzyme immunoassay (EIA), which can detect antibodies to HCV six-to-eight weeks after exposure. If the EIA is positive, than a recombinant immunoblot assay (RIBA) needs to be done to confirm the diagnosis.¹

Treatment of HCV is with interferon plus riboflavin¹⁰ for 48 weeks. Side effects are the same as those for the treatment of HBV.

Hepatitis D

HDV is a defective virus, occurring only in those infected with HBV. Infection with both HBV and HDV is more severe than infection with HBV alone. Since HDV can only coexist with HBV, the transmission is the same as with HBV.¹

Hepatitis E

HEV virus is generally found only in South Asia and North Africa. American travelers to these areas should contact their family health care provider for information on the prevention of contracting this virus.

Conclusion

Of the five known viruses that cause hepatitis, HAV, HBV and HCV cause the most morbidity and mortality in the United States. Immunization against HAV and HBV has caused a decrease in the incidence of these infections. Hopefully, an immunization against HCV will be developed, at which point diseases caused by the most common hepatitis viruses can be brought under control.

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