Hepatitis: Inflammation of The Liver

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Key points:

- Introduction to Hepatitis
- Types
- Pathogenesis
- Epidemiology and Risk Factors
- Complications and Management
- Recent Advances
- Conclusion

Introduction to Hepatitis

Hepatitis refers to Inflammation of the liver, most commonly caused by viral infections. The five major hepatotropic viruses are:

- Hepatitis A (HAV)
- Hepatitis B (HBV)
- Hepatitis C (HCV)
- Hepatitis D (HDV)
- Hepatitis E (HEV)

Globally hepatitis causes 1.34 million deaths annually, mainly due to complications like cirrhosis and hepatocellular carcinoma.[1]

Types

Hepatitis A and Hepatitis E are acute forms of viral hepatitis that are primarily transmitted through the fecal– oral route, usually via contaminated food or water. Both are RNA viruses and typically cause a self-limiting illness that resolves without progressing to chronic liver disease. Chronic infection is generally not seen, although rare cases of chronic Hepatitis E can occur in immunocompromised individuals. Hepatitis E is the most common cause of acute hepatitis worldwide.

Hepatitis B, Hepatitis C, and Hepatitis D are blood-borne viral infections that can lead to chronic liver disease. They are transmitted through exposure to infected blood, including blood transfusions, needle sharing, sexual contact, and vertical transmission from mother to child.

Chronic infection is common with both Hepatitis B and Hepatitis C, whereas Hepatitis D can only occur in individuals who are already infected with Hepatitis B, as it requires HBV for replication. Globally, approximately 325 million people are living with chronic Hepatitis B or Hepatitis C infection.

Pathogenesis

The general mechanism of viral hepatitis begins when the virus enters hepatocytes (liver cells) and replicates within them. This viral replication triggers an immune response which leads to inflammation of the liver. Persistent inflammation and liver injury can progressively result in fibrosis, which may advance to cirrhosis and eventually hepatocellular carcinoma (liver cancer). A key scientific concept in hepatitis pathogenesis is immune-mediated liver damage. For example, Hepatitis B virus (HBV) is considered non-cytopathic, meaning it does not directly destroy liver cells; instead, liver damage is primarily caused by the host immune response, particularly the activity of $CD8^+$ T lymphocytes. Another important concept is viral persistence, whereby chronic infection develops due to mechanisms such as immune evasion, T-cell exhaustion, and viral mutations that enable the virus to escape immune clearance.

Additionally, chronic inflammation promotes the activation of hepatic stellate cells, leading to collagen deposition and the progressive development of liver fibrosis.

Epidemiology and Risk Factors

Globally, viral hepatitis remains a major public health concern. Hepatitis B Virus (HBV) is responsible for causing approximately 254 million chronic infections worldwide. While Hepatitis C Virus (HCV) affects an estimated 58–71 million people. Hepatitis E Virus (HEV) is a leading cause of hepatitis outbreaks, particularly in parts of Asia and Africa, whereas Hepatitis A Virus (HAV) has become less common in many developed countries due to widespread vaccination programs. Key risk factors for viral hepatitis includes unsafe injection practices, contaminated blood transfusions, poor sanitation and hygiene, and high-risk sexual behavior, all of which contribute significantly to the transmission of these infections.[2]

Diagnosis with Clinical Features

The diagnosis of viral hepatitis is based on the presence of characteristic clinical features together with laboratory, serological, molecular, and imaging investigations. Acute hepatitis commonly presents with fever, jaundice, fatigue, nausea, vomiting, and elevated liver enzymes (ALT and AST). In contrast, chronic hepatitis is often asymptomatic in its early stages but may later progress to cirrhosis, portal hypertension, and hepatocellular carcinoma. Laboratory evaluation includes measurement of liver enzymes (ALT and AST), bilirubin levels, and prothrombin time to assess liver function and injury.

Serological markers are used to identify the causative virus, including HBsAg for hepatitis B virus (HBV) infection, Anti-HCV or hepatitis C virus (HCV) exposure, and Anti-HAV IgM for acute hepatitis A virus (HAV) infection. While genotyping is particularly important in HCV infection for guiding treatment decisions. Imaging studies, including ultrasound and FibroScan, help evaluate liver structure and assess the degree of liver stiffness and fibrosis.[3]

Prevention Strategies and Treatment

The prevention and management of viral hepatitis involve a combination of vaccination, public health interventions, behavioral modifications, and antiviral therapies. Vaccination remains one of the most effective preventive measures and is available for hepatitis A (HAV), hepatitis B (HBV), and hepatitis E (HEV). Public health strategies such as ensuring a safe water supply, screening blood and blood products, and promoting safe injection practices are essential in reducing transmission.

Treatment varies according to the type of hepatitis virus. Hepatitis A and E are generally managed with supportive care, as most infections are self-limiting, while effective vaccines are available for prevention.

Chronic hepatitis B is treated with antiviral agents such as Tenofovir and Entecavir, which suppress viral replication and reduce disease progression, although a complete cure is not yet available; current research focuses on achieving a functional cure characterized by the loss of hepatitis B surface antigen (HBsAg). Hepatitis C has been transformed by the development of Direct-Acting Antivirals (DAAs), which achieve cure rates exceeding 90% in most patients. Hepatitis D remains challenging to treat; however, newer therapeutic agents such as bulevirtide, have shown promising results in improving disease outcomes.[4]

References

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