Viral Hepatitis A, B and Non-A, Non-B

A Short Review

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Classical acute viral hepatitis is caused by either the hepatitis A (HAV) or the hepatitis B virus (HBV). Recently an agent was discovered in the liver, which causes the "non-A, non-B" hepatitis, which is transmitted to patients by transfusion.

Viral hepatitis can also occur in other viral diseases caused by cytomegalovirus (CMV), Epstein-Barr virus (Infectious mononucleosis), yellow fever virus, rubella virus and herpes simplex virus.

Clinical Features

The clinical features of viral hepatitis are similar and only the history or demonstration of the etiological agent can provide a diagnosis.

The clinical signs and symptoms of acute viral hepatitis are jaundice, dark urine, pale stool and elevated liver function tests with low grade fever, malaise, nausea and/or vomiting.

Anicteric and symptomless hepatitis is common in hepatitis A but not in hepatitis B. Arthralgia and rash are seen in hepatitis B and possibly caused by antigen-antibody complexes.

Table I shows a comparison of the different features of the three viral hepatitis types.

Hepatitis A

Epidemiology

Hepatitis A occurs worldwide in epidemics often associated with contaminated food or water. It is predominantly found in children or young adults. The virus is contracted through the alimentary tract and excreted in feces. The route of infection is either by personal contact or contaminated food or water. Contaminated milk, shellfish and oysters have been associated with large outbreaks.

The course of infections is usually benign and self-limiting like an enterovirus infection.

Virology and Laboratory Diagnosis

The virus is a 27 nanometer (nm) particle. The virus can be detected in feces early in the disease but routine laboratory methods are not available yet. Specific anti-HAV antibodies of the IgM type are found early in the disease and their demonstration is diagnostic of hepatitis A. Human gamma-globulin containing IgG anti-HAV antibodies protects contacts from contracting the disease.

Hepatitis B

Epidemiology

The hepatitis B virus is transmitted by the parenteral route as blood transfusions, injections with contaminated syringes and accidental exposure of skin to contaminated blood (tattooing, drug addicts, hospital personnel). Sexual transmission is possible. Transmission through the oropharynx is possible if the mucosa is injured.

The prevalence of carriers of hepatitis B is 0.1-0.5 percent in Western populations and as high as 5-15 percent in Asian and African countries. Antibodies to hepatitis B virus are found in 40-50 percent of the Asian population in contrast to only 5-10 percent of the inhabitants of North-Western countries; and 15-30 percent in Eastern and Southern European populations.

About five percent of all patients with clinical hepatitis B develop chronic active hepatitis with highly abnormal liver function tests. A greater number develop a more benign chronic persistent hepatitis with normal or slightly elevated liver function tests. Few cases develop into fulminant hepatitis with liver failure and death.

Virology and Laboratory Diagnosis

Electromicroscopy of infected blood shows three types of particles:

1. Spherical particles with a diameter of approximately 22 nm.
2. Filaments with a diameter of 22 nm. and an average length of 200-400 nm.
3. Enveloped virus-like particles with a diameter of 42 nm. which have been named Dane particles, after their discoverer.
The 42 nm. Dane particles represent the complete hepatitis B viron, and the other morphologic forms represent excess coat protein. Antigenic determinants of the 22 nm. spheres, the filaments, and the envelope of the Dane particle are related and are collectively termed hepatitis B surface antigen (HB\textsubscript{s}Ag). Hepatitis B surface antigen really refers to the collection of antigenic determinants which reside in the seven to nine polypeptides which make up the outer coat of the virus. The inner core of the Dane particle is antigenically distinct from those of the coat protein and is termed hepatitis B core antigen (HB\textsubscript{c}Ag).

Hepatitis B is diagnosed by demonstrating the hepatitis B surface antigen (HB\textsubscript{s}Ag) in the blood. In the carrier state HB\textsubscript{s}Ag may be found indefinitely. Antibodies of the IgG type to this antigen (anti-HB\textsubscript{s}) develop several months after the clinical disease and are only diagnostic of past exposure to hepatitis B. Both tests are readily available to the Medical Director of life insurance companies.

Repeated demonstration of the HB\textsubscript{s}Ag antigen and abnormal liver function tests are suspicious of post-hepatic chronic liver damage with a guarded prognosis. The incidence of hepatomas following hepatitis B is higher than in the normal population.
Table 2
Evaluation of Applicants with a History of Hepatitis

<table>
<thead>
<tr>
<th>Possibility</th>
<th>Lab Results</th>
<th>Evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. LFT-normal</td>
<td>HBsAg - absent</td>
<td>No apparent post-hepatic liver damage.</td>
</tr>
<tr>
<td>2. LFT-normal</td>
<td>HBsAg-present</td>
<td>HBsAg carrier with apparently no liver damage.</td>
</tr>
<tr>
<td>3. LFT-slightly abnormal</td>
<td>HBsAg-present</td>
<td>Probably chronic persistent hepatitis</td>
</tr>
<tr>
<td>4. LFT-slightly abnormal</td>
<td>HBsAg-absent</td>
<td>Possible chronic persistent hepatitis or other causes.</td>
</tr>
<tr>
<td>5. LFT-abnormal</td>
<td>HBsAg-present</td>
<td>Probably chronic active hepatitis</td>
</tr>
<tr>
<td>6. LFT-abnormal</td>
<td>HBsAg-absent</td>
<td>Possible chronic active hepatitis or other causes.</td>
</tr>
</tbody>
</table>

LFT = Liver function tests

There are other antigens and antibodies and subtypes which can be demonstrated during and after clinical hepatitis B, but these are of little significance for the Medical Director. One of them is the Core-Antigen (HBcAg) and its antibody (anti-HBc). This antibody is formed early in the disease, long before the antibody to the surface antigen (anti-HBs) is formed. This enables the clinician to confirm the rare cases of acute hepatitis B or post-infection where HBsAg cannot be demonstrated.

Figure 1 shows the time relationship of clinical and laboratory findings of hepatitis B.

Non-A, Non-B Hepatitis

Epidemiology

Non-A, non-B hepatitis has been associated with post-transfusion hepatitis in cases, where the presence of other viruses could be excluded by sensitive laboratory tests. There may be one or more of these non-A, non-B viruses causing a post-transfusion hepatitis. As in hepatitis B there is a chronic stage of this form with liver damage.

Virology and laboratory diagnosis

Non-A, non-B viruses have been found in liver biopsies. Chimpanzees are susceptible to experimental infection with these agents. Laboratory tests for diagnosis in humans are not yet available.

Table 2 shows how applicants with a history of hepatitis B could be evaluated with respect to mortality risks.

References

