Hepatitis: 
Risks confronting nurse anesthetists

PATRICIA A. O'NEILL, CRNA, BSN
Toledo, Ohio

The author reviews the various types of hepatitis and modes of transmission. Risk factors facing the nurse anesthetist are examined, along with preventive measures that can be taken to minimize the potentially harmful sequelae of the disease. Information regarding a vaccine for active immunity against hepatitis B also is presented.

Hepatitis is a disease that has been well known for many years and has recently regained recognition. While there is nothing exceptionally new about the disease itself, recent advances in the prevention and treatment of hepatitis are noteworthy.

Types of hepatitis

Hepatitis occurs in an acute and a chronic phase. Acute hepatitis is a disease in which the hepatocytes are inflamed. This inflammation is frequently due to a viral infection or ingestion of a toxic drug; less frequently, it may be due to sepsis or congestive heart failure.

Viral hepatitis. Viral hepatitis may have a gradual or sudden onset. (The organisms responsible for causing viral hepatitis are listed in Table I.) Early symptoms that characterize the disease include dark urine, fatigue, and anorexia. Other symptoms which may occur, in order of decreasing frequency, include nausea, fever, abdominal discomfort, myalgia, pruritis, and arthralgia. Seven to 14 days before the appearance of jaundice the concentrations of serum transaminase enzymes will be elevated. The concentrations of these enzymes will begin to decline a short time after the jaundice becomes noticeable. The concentration of the serum bilirubin is usually no more than 20 mg per 100 ml unless the patient presents with severe liver disease or hemolysis. It is not uncommon to see mild anemia and lymphocytosis. The clinical course of viral hepatitis is, for the most part, uneventful and the recovery of liver function is complete.

The type A virus, also known as infectious hepatitis, is a highly infectious form of hepatitis. Information regarding transmission of the viruses and incubation periods is listed in Table II.

Two weeks prior to and two weeks following the onset of clinical symptoms, the patient harboring the virus is potentially infective. It is during this time that strict attention should be paid to good hand washing and strict stool isolation. Patients who develop type A hepatitis have a good prognosis and do not develop chronic liver disease.

<table>
<thead>
<tr>
<th>Table I</th>
</tr>
</thead>
<tbody>
<tr>
<td>Causative organisms of viral hepatitis</td>
</tr>
<tr>
<td>Type A Virus</td>
</tr>
<tr>
<td>Type B Virus</td>
</tr>
<tr>
<td>Non-A, Non-B Virus</td>
</tr>
<tr>
<td>Epstein-Barr Virus</td>
</tr>
<tr>
<td>Cytomegalovirus</td>
</tr>
</tbody>
</table>
The type B hepatitis, also known as serum hepatitis, is probably the most common type of viral hepatitis. The type B virus has never been successfully cultured or isolated. The identification of several viral particles associated with type B hepatitis virus has been possible, however, through the use of electron microscopy and immunologic techniques. One of these particles, felt to be similar to the type B virus, is the Dane particle which consists of hepatitis B surface antigen (HBsAG), core particles identified as the hepatitis B core antigen (HBcAG), and E antigen (HBeAG).

It is helpful to monitor the titers of these antigens and their antibodies so that the course of hepatitis may be followed, immunity may be determined, and the state of these patients' infectivity may be assessed. Patients with the hepatitis B virus may have the HBsAG detectable in their serum several weeks before the onset of symptoms. The titers of the HBsAG are decreasing by the time of onset of clinical symptoms and are negligible by six weeks. The potential for infectivity is indicated by the presence of HBsAG in the serum for longer than six months. This also is a good indication that HBsAG will persist indefinitely. An individual in whom this occurs is considered to be a chronic carrier.

The non-A, non-B virus includes several undetected viruses. According to Stoelting and Dierdorf, 80% of hepatitis cases resulting from blood transfusions are felt to be due to these viruses. The development of immunity to this type of hepatitis is not certain. A common complication is chronic liver disease.

Infectious mononucleosis caused by the Epstein-Barr virus can produce a mild hepatitis. Jaundice is seen in 10-20% of these patients. An increase in the titer of specific antibodies to the virus confirms the jaundice diagnosis.

The cytomegalovirus can produce a mild hepatitis that rarely progresses to chronic liver disease. As stated by Stoelting and Dierdorf, the most serious consequence of infection by the cytomegalovirus is destruction of the immature central nervous system during the neonatal period.

**Chronic hepatitis.** Hepatitis may also occur in chronic state. Chronic hepatitis, as defined by Kolts and Spindle, is the presence of abnormal liver function for more than six months as a result of continuing hepatic parenchymal inflammation. It varies clinically in that the patient may be asymptomatic or fatigued and incapacitated. Chronic hepatitis may take an active form in which cirrhosis and hepatic failure are the ultimate results. Chronic hepatitis may take on a persistent benign, non-progressive form. Serum transaminase levels may be abnormal for years.

**Risk factors for health care professionals.**

Understanding the signs and symptoms of the various forms of hepatitis increases our ability to suspect and detect the disease. In spite of this acquisition of knowledge, there is an increased risk of hepatitis among health care professionals. The risk of hepatitis B among persons employed in health-related fields is estimated to be approximately four times that of the general population. Some members, such as dentists and surgeons, have been shown to be at greater risk for contracting hepatitis B infections than others in the medical field. What places some persons, including the nurse anesthetist, at greater risk than others, is probably the person's contact with HBsAg-positive patients, or contact with invasive procedures per-

<table>
<thead>
<tr>
<th>Table II</th>
<th>Transmission</th>
<th>Incubation period</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type A Virus</td>
<td>Fecal-oral route</td>
<td>2-6 weeks</td>
</tr>
<tr>
<td>Type B Virus</td>
<td>Parenteral route (Through blood transfusion or percutaneous inoculation) Oral to oral Sexual</td>
<td>8-20 weeks</td>
</tr>
<tr>
<td>Non-A, Non-B Virus</td>
<td>Innoculation</td>
<td>3-12 weeks</td>
</tr>
<tr>
<td>Epstein-Barr Virus</td>
<td>Oral contact Innoculation</td>
<td>28 days</td>
</tr>
</tbody>
</table>
formed on patients whose serological status is unknown.\(^5\)

The transmission of type B viral hepatitis via contaminated blood has been well documented. Experimental evidence has been obtained demonstrating the infectivity of saliva and semen containing hepatitis B virus (HBV) surface antigen.\(^4\) In addition to saliva, mucus and urine may periodically contain significant concentrations of the antigen.\(^6\) Pleural effusion has also been documented as the source of virus in a human case of hepatitis B.\(^4\) There are situations daily in which the nurse anesthetist is exposed to such contaminants. Anesthetists who routinely give injections and instrument the oral cavity are at obvious risk of accidental needle puncture and contamination by saliva. Anesthetists and surgeons therefore, together with other operating room personnel, are at risk of being infected.\(^6\)

The risk factors will remain constant. There are, however, preventive measures that can be taken to minimize the potentially hazardous sequelae which are consequences of the previously mentioned risk factors.

The potential HBAg-status should be assessed before the patient comes to surgery. It is well known that certain classes of persons are more likely than others to be HBAg-positive.\(^7\) The patients under suspicion as hepatitis B carriers are listed in Table III.

A “high-risk” sticker should be placed on charts and specimens of suspected patients until proven negative.\(^8\) Due to the expense of the test, it would not be feasible for all surgical patients to be routinely tested preoperatively. Routine testing of all high risk cases should, however, be completed preoperatively.\(^6\)

Precautions should be taken when a known carrier (HBsAg-positive) is operated on, to prevent contact with the patient’s blood or secretions. It is recommended by Waterson\(^7\) that all staff wear gowns, gloves and plastic over shoes. After the operation, the floors, furniture, and visibly soiled areas on walls should be washed with hypochlorite detergent.\(^8\) Chernesky and Browne recommend that the anesthetic machine be washed down with a hypochlorite detergent solution. They also suggest that if a respirator has been used, it should be decontaminated with formalin gas or ethylene oxide.

Accidental skin punctures are encountered in the operating room. Individuals suffering needle sticks from antigen-positive patients run only about 10% risk of developing hepatitis. There are certain measures that should be taken when faced with such a situation. It is important to find out if the needle had been used on an antigen-positive patient. The person suffering the needle stick should be checked for anti-HBs. If the person stuck by the needle has anti-HBs in his serum, then no treatment will be needed. The presence of anti-HBs implies recovery from infection, noninfectivity and probably protection from future HBV infection.\(^8\)

### Table III

**Patients to be suspected as hepatitis B carriers**

1. All patients with liver disease acute or chronic.
2. Patients undergoing hemodialysis, or those who have had a renal transplant.
3. All patients with leukemia reticulosis, polyarteritis nodosa or polymyositis.
4. Patients treated with radiotherapy or immunosuppressive drugs.
5. Immigrants or visitors from countries with a high incidence of carriers.
6. Persons who have been transfused in, or recently returned from, countries with a high incidence of carriers (namely tropical and subtropical areas and Greenland).
7. Patients who have received blood or blood products in the last six months or who have been transfused with blood or blood products from a paid donor.
8. Inmates of prisons or institutions for the mentally defective.
9. Drug addicts, prostitutes, and homosexuals.
10. The tattooed.
In most cases, this test will not be available and the antibody status of the person stuck will not be known. It is recommended by Neimark and Rogers that five ml of hepatitis B immune globulin (HBIG) be administered as soon as possible after the exposure period. This must be done within 48 hours to achieve success, followed by a similar dose one month later. Gammaglobulin is not recommended since anti-HBs content is unpredictable.

In addition to the measures that can be taken after experiencing a needle stick from an antigen-positive patient, there is now a vaccine available which induces active immunity against hepatitis B. The source of raw material for the HBV vaccine is the plasma of HBsAg carriers. HBsAg-positive plasma is collected from carriers and specially licensed blood donor centers in metropolitan areas across the country.

A number of routine safety tests, required by the FDA, are employed in the preparation of hepatitis B vaccine. There are procedures performed to confirm the absence of adventitious infectious agents and to allay concerns that the HBV vaccine might contain host cell components or proteins capable of inducing a deleterious immune reaction in the liver. The Centers for Disease Control (CDC) have established a surveillance mechanism to monitor for adverse reactions.

The plasma pools used to prepare the HBV are composed at least in part from plasma from homosexual carriers. A question arises about the danger of transmitting acquired immunodeficiency syndrome (AIDS) as a result of the HBV vaccine. A statement was published by an Inter-Agency Group on Vaccine Safety made up of representatives from the CDC, FDA, and National Institutes of Health (NIH). It was pointed out by these independent authorities that the multistage purification and inactivation process used for the HBV vaccine is capable of inactivating any known or putative infectious agent, including unusual pathogens such as slow viruses. Jilg and Dienhardt have more recently pointed out that the susceptibility of the LAV/HTLV III virus is such that it would be readily inactivated by each of the inactivation steps used in vaccine preparation.

Homosexual recipients are clearly susceptible to the development of AIDS, but no excess incidence of AIDS has been observed in vaccinated homosexual men. Gocke states, "No cases of AIDS have occurred in the many heterosexual recipients of the vaccine." Several hundred vaccine recipients have been followed from three to five years after vaccination, and none have developed anything resembling a chronic autoimmune process. The most current reports cited by Jilg and Dienhardt support this statement.

Another problem that has been considered is the possibility of experiencing the Gullian-Barre Syndrome (GBS). This syndrome occurred so infrequently that it might not have been observed in the limited number of vaccine recipients to date. GBS was associated with the influenza virus used to prevent the swine flu. There is information in literature suggesting that the GBS was associated with the natural influenza virus infection. This fact could lead one to anticipate the possibility that GBS might be encountered after swine flu vaccination. GBS is not associated with the infections resulting from the hepatitis B virus. The chronic complications of HBV infection seem to require persistent infection, whereas the hepatitis B vaccine is an inactivated rather than a live virus product.

Additional concerns in dealing with the hepatitis B vaccine are not serious in nature. Twelve to 20% of vaccine recipients were noted to experience moderate soreness. In comparison with other vaccines, there were relatively few side effects noted.

Through an understanding of the types of hepatitis and a recognition of the risk factors involved, it becomes evident that hepatitis is a persistent potential problem for the nurse anesthetist. Awareness of preventive measures that can be taken and of the option for active immunity makes hepatitis less threatening to the nurse anesthetist.

REFERENCES

AUTHOR
Patricia A. O'Neill, CRNA, BSN, received her Bachelor of Science in Nursing from the University of Toledo - Medical College of Ohio in Toledo in 1980. She practiced nursing for three years in pediatric intensive care. She is a graduate of the St. Vincent Medical Center School of Anesthesiology for Nurses. Currently she is a staff nurse anesthetist at St. Joseph's Hospital in Ann Arbor, Michigan.