Contents lists available at www.innovativejournal.in

INNOVATIVE JOURNAL OF MEDICAL AND HEALTH SCIENCE

Journal homepage: http://www.innovativejournal.in/index.php/ijmhs

ISSN No. 2277-4939

VIRAL HEPATITIS AND THE ANAESTHESIOLOGIST

Safiya I Shaikh*[1], Ashly John[2]

*[1] *Professor and Head, Department of Anaesthesiology, Karnataka Institute of Medical Sciences, Hubli, Karnataka, India*
[2] *Post Graduate student, Department of Anaesthesiology, Karnataka Institute of Medical Sciences, Hubli, Karnataka, India*

ARTICLE INFO

Corresponding Author:
Safiya I Shaikh,
Professor and Head, Department of Anaesthesiology, Karnataka Institute of Medical Sciences, Hubli, Karnataka, India

Keywords Viral Hepatitis, Anaesthetic implications, Hepatitis B Vaccine

ABSTRACT

Viral hepatitis is a disease which causes an enormous amount of morbidity and mortality.There are several types with which the anaesthetist should be familiar, some of which represent occupational hazards while others are part of the differential diagnosis in the patient who develops hepatitis postoperatively.Hepatitis can occur due to infections, alcoholism, drugs and metabolic disorders. Infectious hepatitis especially viral is not only common, but also has most serious implications. Anaesthesiologist may have to evaluate, prepare and anaesthetize patient of hepatitis for various surgeries on elective, semi elective or emergency basis.. The write up also includes important perioperative considerations for the operative procedures.

INTRODUCTION

Hepatitis is a feature of many viral diseases usually resulting as a part of generalized infection which involves the liver. There are at least five different hepatitis viruses (HAV to HEV) that primarily target the liver in humans--called hepatitis viruses, whereas the role of sixth virus (HGV) is doubtful. Hepatitis viruses produce a broad clinical spectrum of illness ranging from asymptomatic to symptomatic such as malaise, anorexia, nausea, abdominal pain, fever and jaundice[1.2].. Sometimes, an acute liver failure is produced which is life threatening [3]

Disease spectrum

The icteric phase of infection is seen with yellow tingling of the skin, sclera and mucous membrane, and the jaundice produced is obstructive in type with raised bilrubin, dark bile- containing urine and passing of pale stool by the infected individuals. Further, the liver function is affected abnormally with raised serum transaminase levels. Though the duration of illness is variable, it usually lasts for 2-3 weeks. Anicteric hepatitis is also seen in all the forms of viral hepatitis along with disturbances in liver function, fever and other constitutional signs , and symtoms but no frank jaundice. Thus, clinically these infections are difficult or rather impossible to distinguish from one another.[4]

Laboratory tests reveal mild anemia and lymphocytosis, rise in aminotransferases (AST and ALT), 7 to 14 days before the onset of jaundice. It begins to decrease shortly after the appearance of jaundice. The rise does not correlate with severity[5]. Plasma bilirubin increases for 10-14 days and then decreases over 2-4 weeks. Rise in globulin suggest chronic hepatitis; in severe acute viral hepatitis - hypoalbuminemia and prolonged prothrombin time (PT) are seen [6]

Hepatititis Virus and Infections

All hepatitis viruses are RNA viruses except HBV (Hepadna virus, 42nm in size, enveloped virus) which is a DNA virus. HAV (Picornavirus, 27-32nm in size, non-enveloped virus) and HEV(Calcivirus, 27-34 nm in size) are transmitted by the faeco- oral route and both the type of infections resolve and usually do not result in a carrier stage. In contrast, HBV, HDV (Delta, 35-37 nm in size) and HCV (Flavivirus, 30-60 nm in size, enveloped) are transmitted through blood and the blood products/ equipment, and by sexual transmission that may lead to chronic carriage in around 2-3% cases each with HBV and HCV infections.[4]

However, approximately 30-40% of the viral hepatitis cases still remain unclassified despite highly sensitive serological techniques that are available commercially. This has thus led to the speculation that other newer hepatotropic viruses like Hepatitis G(HGV), Sen virus and

TT virus(TTV) might be responsible for these non-A to non-E cases of viral hepatitis[7]

HAV infection (infectious hepatitis) is a highly contagious enterovirus transmitted by the intake of fecal-contaminated food. It is not transmitted by blood transfusion. Viremia is present for several days prior to the onset of clinical symptoms. Virus is shed in stool for 14 to 21 days before the onset of jaundice. Patients are usually not infectious after 21 days. There are no chronic carriers, and chronic liver disease does not occur. Fulminant hepatic failure is rare (0.14 to 2%) in the absence of pre-existing liver disease. Patients with HBV who acquire a HAV infection typically have an uncomplicated clinical course. In contrast, 41% of patients with chronic HCV who acquire a HAV superinfection progress to fulminant hepatitis with a 35% fatality rate.[8]

HBV is primarily transmitted through percutaneous inoculation of infected serum or blood products. HBV is present in the serum and body secretions of most patients early in the course of acute HBV. The surface coat of the virus is composed of a polypeptide that acts as the major HBV surface antigen (HBsAg). Development of serum antibodies to HbsAg (anti-HbsAg) confirms immunity. Individuals who have detectable HbsAg for >6 months have a chronic HBV infection.

HCV which was discovered in 1989, was the major cause of transfusion-related hepatitis until the 1990s. It is also transmitted by percutaneous inoculation of infected serum or blood products, occupational exposure to blood or blood products, and intravenous drug abuse. HCV is the most common blood-borne infection in the United States; it accounts for 40% of chronic liver disease. Fortunately, serologic tests for HCV now exist. [9] Because of their use in screening donated blood, HCV has almost been eliminated as a cause of post-transfusion hepatitis.

HDV is an RNA strand that coinfects with and requires the helper function of HBV for its replication and expression. HDV may be acquired simultaneously with HBV or may be a superinfection of a patient with prior HBV infection. HBV and HDV coinfection substantially increases the likelihood of fulminant hepatitis and death.

HEV is an enterically transmitted virus that has epidemiologic features resembling HAV. HEV infections occur primarily in Asia, Africa, and Central America.

Other important but infrequent causes of viral hepatitis include cytomegalovirus, Epstein-Barr virus, and herpes simplex. These viruses typically produce benign, anicteric disease and often escape detection preoperatively. However, in rare circumstances, particularly in immunocompromised patients, they can disseminate, causing acute hepatitis, fulminant hepatic failure, and death [10]

Anaesthetic concerns

1. Pre operative evaluation of hepatitis patients.
2. Intra operative considerations [5,11]

Preoperative Considerations

The diagnosis of viral hepatitis is established by measuring viral proteins (antigens) in the blood and identifying characteristic immunologic responses (antibodies) during and after acute infection. Because of the risk to operating room personnel, the diagnosis of infectious hepatitis should be actively pursued in any patient with liver disease of unknown cause. If hepatitis B is suspected, serologic studies of the carrier may help determine the infectious risk to hospital personnel. [12] All patients with acute hepatitis B should be considered infectious.

Hepatitis B is an occupational risk for anesthesiologists. ([13] Hepatitis B vaccination is protective in the vast majority of health-care workers, [14] and vaccine responders are also protected against delta infection. [15] Vaccination for anesthesiologists is strongly recommended by the Centers for Disease Control and Prevention, [16] especially in light of a retrospective study suggesting that gloves are not sufficient protection for this disease.[17]

If a health-care worker is exposed to a needle stick, both the health-care worker and the source (contact) should be tested for HCV antibody and HBV serologic markers (surface antigen, surface antibody, core antibody, and E antigen). If the patient has markers for HBV infection (surface antigenemia), the health-care worker should receive a dose of Hepatitis B immune globulin [18], and a course of HBV vaccination should be commenced within 7 days. If the health-care worker is immune to HBV (surface antibody positive), no treatment is needed. With exposure by needle stick to HCV, the current recommendation is to monitor the health-care worker for seroconversion to HCV antibody positive status at 3 and 6 months. If seroconversion occurs, interferon at conventional dosage (3 million units three times a week) should be commenced. A more aggressive approach is to detect infection by performing HCV RNA by PCR at 3 and 6 months in addition to HCV antibody. If conversion occurs, interferon, 5 to 10 million units daily, has been recommended for a minimum of 6 months.

If possible, elective surgery should be postponed in patients with acute hepatocellular injury because of increased risk of morbidity and mortality. In particular, surgery carried out in the presence of acute viral hepatitis is associated with a higher than normal incidence of major complications. The unusual patient with a cholestatic pattern of injury associated with hepatitis probably should also not undergo elective surgery and anesthesia.

The preoperative management of a patient with acute parenchymal liver disease will depend on the severity of liver dysfunction.In patients with acute encephalopathy, sedative drugs for premedication may dramatically exacerbate encephalopathy and, therefore, should be avoided. Frequent blood glucose monitoring is important in preoperative management, as these patients may rapidly develop hypoglycemia and secondary neurologic damage. Acid-base disturbances, particularly respiratory alkalosis, may be profound. Electrolyte disturbances may contribute to encephalopathy, and appropriate therapy should be initiated before the surgical procedure. Hypoxemia is a

frequent finding [19] despite hyperventilation. Many patients with acute hepatocellular injury also develop renal insufficiency.[20] Damage to kidneys may be caused by the same toxin affecting the liver or, more commonly, is secondary to hepatic damage.

If coagulopathy is present, surgical bleeding may be severe. Correction of clotting factor deficits with vitamin K and fresh frozen plasma may be indicated. Similarly, appropriately timed platelet transfusions may aid the surgeon. Patients with liver disease are also more susceptible to bacterial infection.

In the preoperative management of a patient with an isolated abnormality of liver function tests, one should never assume that the abnormality is definitely due to alcohol (e.g., an elevated alkaline phosphatase cannot be explained on the basis of alcohol). An isolated elevation of gamma glutamyl transpeptidase is typical of most drinkers. The degree to which the transaminase levels are elevated dictates further management; if less than twice normal values are observed, it is important to try to elicit whether there has been recent exposure to potentially hepatotoxic medications or toxins (especially alcohol), and what the risk factors are for the acquisition of infectious liver disease (viral hepatitis) in the individual patient. If the patient has a twice normal increase in aminotransferases and/or gamma-glutamyltransferase, complete abstinence from alcohol should be advised and the tests should be repeated after a week. If the tests are still abnormal, a full work-up, including complete blood count (CBC) and platelets, viral serologies, autoantibodies, ceruloplasmin, and iron studies are indicated. A right upper quadrant ultrasound is also indicated in the work-up of a persistent abnormality.

Elective surgery should not be considered in patients with acute hepatitis or cirrhosis, because the operative mortality rate is quite high in these patients. In the event that the liver function tests are markedly elevated (>3 times normal), elective cases that require general or regional anesthesia should be delayed until further work-up is completed, as each of these forms of anesthesia reduced hepatic blood flow by 30 to 50 percent, which may set the stage for rapid deterioration in liver function. Patients undergoing exploratory laparotomy with unsuspected parenchymal liver disease have a 31 percent mortality rate. [21]

Intraoperative Considerations

The reason for the poor prognosis in patients undergoing surgery in the presence of acute viral hepatitis may be related to decreased total hepatic blood flow that accompanies all forms of anesthesia. Additionally, total hepatic necrosis may be precipitated by relative hypoperfusion in an already diseased liver. Thus, if the diagnosis is uncertain or emergency surgery is necessary in patients with acute parenchymal disease, attempts to maintain hepatic blood flow at near normal levels should be the goal of intraoperative therapy. Although the relationship between anesthetic-induced changes in liver blood flow and liver function is not clear, it seems reasonable to maintain liver blood flow as close to normal as possible. [22]

Mechanical ventilation with positive pressure is theoretically more deleterious to liver blood flow than spontaneous ventilation. On the other hand, hypercarbia initiates sympathetic stimulation of the splanchnic vasculature, resulting in decreased portal blood flow. Because the nature and anatomic location of the surgery, anesthetic drugs, and techniques may all modify liver blood flow, CO_2 probably should be maintained in the range of 35 to 40 mm Hg.

Drug disposition in the presence of acute parenchymal disease may be difficult to predict because of the marked differences in liver response to high and low extraction ratio drugs. [23] For example, the half-life of meperidine is considerably prolonged in patients with parenchymal liver disease. [24] Furthermore, certain intravenous drugs such as chlorpromazine, which act on the central nervous system (CNS) have a more pronounced depressant effect in patients with hepatic impairment. [25]

Advanced liver disease may impair the elimination, prolong the half-life, and potentiate the clinical effects of several drugs, including morphine, meperidine, alfentanil, vecuronium, rocuronium, mivacurium, benzodiazepines, and dexmedetomidine. These drugs should be used cautiously in patients with cirrhosis or end-stage liver disease from any cause and their dosage and administration should be adjusted accordingly. In addition, the liver synthesizes hydrolytic enzymes that catalyze the intravascular inactivation of certain local anesthetic esters and other drugs such as succinylcholine. Because pseudocholinesterase is relatively stable, prolonged apnea from pseudocholinesterase deficiency after succinylcholine administration is rare, even in patients with fulminant hepatic failure

Summary

Viral hepatitis now constitutes the main hazard of transfusion of human blood and certain blood products. Care and vigilance must be exercised in the operating room at all times in order to avoid the hazard of viral hepatitis.

The anaesthetist must appreciate that he will almost certainly come into contact with asymptomatic carriers in the operating room. He must play an active role in insisting on testing patients who are in the suspect groups preoperatively, be prepared to deal with patients in the operating room

Elective surgery should be postponed and any medications that could be harmful to the liver should be disregarded in patients suspected of having acute viral hepatitis. An increase in the prothrombin time is the first sign of acute severe liver failure. Extrahepatic manifestations resulting mainly from small- and medium-sized vessel alteration, and adverse effects caused by specific drug therapy are associated with chronic viral hepatitis and are likely to alter anaesthetic care. A titrated anaesthesia should be provided and agents not eliminated by the liver should be favoured. Vasopressor therapy should be administered early to control a systemic intraoperative blood pressure

decrease associated with a high cardiac output. Prophylactic antibiotics should take into consideration the risk of translocation of gut bacteria to the systemic circulation. Prophylactic guidelines of hepatitis nosocomial transmission should be respected[26]

References

1. Abraham P-GB virus C/hepatitis G virus- its role in human disease redefined? *Indian J Med Res* 2007; **125**: 717-9
2. Kar P- Viral Hepatitis- Is it a challenge in the Indian subcontinent? *Indian J Med Res* 2007; **125** :608-11
3. Acharya SK, Panda SK, Saxena A, Gupta SD- Acute hepatic failure in India: a prospective from the East. *Gastroenterol Hepatol* 2000; **15**: 473-9
4. Tewari R, Aggarwal A ,Devi P, Sero-prevalence of hepatitis B, hepatitis C and human immunodeficiency viruses amongst drug users in Amritsar. *Indian J Med Microbiol* 2006; **24**: 151-2
5. *Hsu H, Feinstone SM, Hoofnagle JH*. Acute viral Hepatitis. In Mandell GL, Bennett JE, and Dolin R, editors, Principles And Practices Of Infectious Diseases, 4th edition, New York: Churchill Livingstone, 1995; 1136-1153
6. *Kawai H, Feinstone SM*. Acute viral hepatitis. In: Mandell GL, Bennett JE, Dolin R editors. Principles and Practice of Infectious Diseases. 5th edition, Philadelphia: Churchill Livingstone, 2000; 1280-282.
7. Das K, Kar P, Gupta RK, Das BC- Role of transfusion transmitted virus in acute viral hepatitis and fulminant hepatic failure of unknown aetiology. *J Gastroenterol Hepatol* 2004; **19**: 406-12
8. Vento S, Garofano T, Renzini C et al: Fulminant hepatitis associated with hepatitis A virus superinfection in patients with chronic hepatitis C. N Engl J Med 1998; 338: 286
9. Scott JD, Gretch DR: Molecular diagnostics of hepatitis C virus infection: a systematic review. JAMA 2007; 297: 724
10. Eriksson LS, Broome U, Kalin M, Lindholm M: Hepatotoxicity due to repeated intake of low doses of paracetamol. J Intern Med 1992; 231: 567
11. *Rabin L.* Hepatitis. In: Mandell GM, editor in Chief, Atlas of Infectious Diseases, volume VII, Philadelphia: Churchill Livingstone 1996; 2.01-2.54.
12. Lentschener C, Ozier Y. What anaesthetists need to know about viral hepatitis. Acta Anaesthesiol Scand. 2003 Aug;47(7):794-803. Review. PubMed PMID: 12859298.
13. Berry AJ, Isaacson IJ, Kane MA et al: A multicenter study of epidemiology of hepatitis B in anesthesia residents. Anesth Analg 64:672, 1985.
14. Dienstag JL, Werner BG, Polk BF et al: Hepatitis B vaccine in health care personnel: Safety, immunogenicity, and indicators of efficacy. Ann Intern Med 101:34, 1984.
15. McAleer WJ, Buynak EB, Maigetter RA et al: Hepatitis B vaccine from recombinant yeast. Nature 307:178, 1984.
16. Centers for Disease Control: Update on hepatitis B prevention: Recommendations of the immunization practices advisory committee. Ann Intern Med 107:353, 1987.
17. Reingold AL, Kane MA, Hightower AW: Failure of gloves and other protective devices to prevent transmission of hepatitis B virus to oral surgeons. JAMA 259:2558, 1988.
18. Centers for Disease Control: Immune globulins for protection against viral hepatitis. Ann Intern Med 96:193, 1982.
19. Ward ME, Trewby PN, Williams R et al: Acute liver failure. Anesthesia 32:228, 1977.
20. Wilkinson SP, Arroyo VA, Moodie H et al: Abnormalities of sodium excretion and other disorders of renal function in fulminant hepatic failure. Gut 17:501, 1976.
21. Powell-Jackson P, Greenway B, Williams R: Adverse effects of laparotomy in patients with unsuspected liver disease. Br J Surg 69:449, 1982.
22. Gelman S, Fowler KC, Smith LR: Liver circulation and function during isoflurane and halothane anesthesia. Anesthesiology 61:726, 1984.
23. Williams RL: Drug administration in hepatic disease. N Engl J Med 309:1616, 1983.
24. McHorse TS, Wilkinson GR, Johnson RF et al: Effect of acute viral hepatitis in man on the disposition and elimination of meperidine. Gastroenterology 68:775, 1975.
25. Read AE, Laidlaw J, McCarthy CF: Effects of chlorpromazine in patients with hepatic disease. Br Med J 3:497, 1969.
26. Saxena R, Zucker SD, Crawford JM: *Anatomy and physiology of the liver*. In: Zakim D, Boyer D, ed. *Hepatology: A Textbook of Liver Disease*, Philadelphia: WB Saunders; 2003:3-30
27. Harville DD, Dummerskill WHJ: Surgery in acute hepatitis: Causes and effects. JAMA 184:257,1963