Kathmandu University Medical Journal (2006), Vol. 4, No. 4, Issue 16, 415-418

Original Article

Ultrasound findings in acute viral hepatitis

Sudhamshu KC
Liver Unit, National Academy of Medical Sciences, Bir Hospital Kathmandu, Nepal

Abstract
Aim: Serological markers for the virus remain mainstay of diagnosis of acute viral hepatitis. However, it is not available in all part of our country. The aim of this study is to find out the sonological findings of the hepatobiliary system that may aid to clinch the diagnosis of acute viral hepatitis.
Materials and methods: One hundred seventy seven consecutive patients with clinical diagnosis of acute viral hepatitis from June 2004 to June 2006 attending liver clinic were enrolled in this study. After exclusion of 32 patients 145 patients with definitive diagnosis by serological confirmation were studied.
Result: Hepatitis E (85%) was most common followed by B (10%) and A (5%). Gall bladder finding was more common than hepato-splenomegaly. Collapsed gall bladder with increased wall thickness and pericholecystic oedema was present in more than 50% of the patient. In HAV hepatitis it was present in all patients while in HEV hepatitis it was present in 84% patients.
Conclusions: Gall bladder findings in ultrasound are present in over 80% of enterically transmitted hepatitis virus. Thus, it can be used to diagnose acute hepatitis when serological tests are not available.

Key words: Ultrasound, gall bladder, acute hepatitis

Acute viral hepatitis is common cause of morbidity among liver disease prevalent in Kathmandu valley. It is associated with increased mortality when it is contracted during third trimester of pregnancy. In Kathmandu valley an epidemic of viral hepatitis was reported in 1973 involving 10000 cases. It was associated with high mortality rate in pregnant women[1]. Due to poor sanitary condition and poor drinking water supply along with improper sewerage system we are still prone to water borne disease like viral hepatitis. Although it can be diagnosed by clinical presentation, serological diagnosis is the basis of confirmation of the diagnosis in acute hepatitis. However, due to cost factors and other reasons it is not available in most part of the country. Noninvasive imaging diagnosis technique of ultrasonography (USG) is very important in diagnosing hepatobiliary conditions. In this prospective study USG findings were evaluated to see if it could help in diagnosing acute hepatitis along with classical clinical presentation.

Material and Methods

This study was carried from June 2004 to June 2006 in Kathmandu valley. One hundred and seventy seven consecutive patients of acute hepatitis attending Liver clinic were enrolled in this study. One hundred and forty five patients with uncomplicated acute viral hepatitis diagnosed clinically and confirmed serologically were studied. Serological markers of Anti HAV IgM, Anti HBc IgM plus HBsAg, and Anti HEV IgM (by ELISA) were used to confirm the diagnosis of hepatitis A, B and E respectively. The exclusion criteria were presence of chronic liver disease, dual pathology, co-morbid conditions and negative serological marker for viruses. With this exclusion criteria 32 patients (negative for any serological marker 11, chronic alcoholism 5, pregnancy 4, congestive heart failure 3, cirrhotic patient 3, enteric fever 2, tropical splenomegaly 2, chronic cor-pulmonale 1, paracetamol poisoning 1) were excluded. Ultrasound examination was done in every patient after overnight fasting in supine position. Those patients who admitted eating or drinking after repeated questioning were asked to come next day as it could alter the findings of gall bladder. All patients were asked to attend OPD for repeat USG after 3-4 weeks. Doppler examination was done in the patients when there was suspicion of portal hypertension during USG examination.

Correspondence
Dr. Sudhamshu K.C.
Liver Unit, National Academy of Medical Sciences,
Bir Hospital Kathmandu, Nepal
Email: Sudhamshu.liver@gmail.com

Results

Demographic variables are given in Table 1. Hepatitis A was common in lower age group as expected. However, there was a patient of 54 years suffering from HAV hepatitis. Compared to HEV hepatitis in same age, it was more severe. HBV hepatitis was exclusively present in young males. Prodromal symptoms were present in almost all cases of acute hepatitis. Anorexia, nausea and pain abdomen were the commonest symptoms. Pruritus was present in just above 50% of the patient of HEV hepatitis. Interestingly, 12 patients were referred from surgical outdoor where they were investigated for obstructive jaundice. Anicteric hepatitis at presentation was 50% in HBV hepatitis and 5% in HEV hepatitis. Anicteric HEV hepatitis patients had milder form of disease and milder liver dysfunction. Other presenting complaints are given in table 2. Liver biochemistry was deranged in all patients. Typically transaminase level was raised with an average of 15 times the upper level of normal limit (Table 3). In HEV hepatitis patients, aspartate aminotransaminase (AST) level was equally high as alanine aminotransaminase (ALT) and in some cases AST was more than ALT. Those patients who had already taken Ayurvedic medication before consultation showed high alkaline phosphatase level and AST. Prothrombin time was within normal limit in most of the cases. Ten cases needed vitamin K injections. It was abnormally prolonged in two cases that were diagnosed as fulminant hepatic failure and required fresh frozen plasma transfusion. The time taken for bilirubin and transaminase to fall took longer in cases taking Ayurvedic medications. However, due to lack of follow up in most of the cases, duration is difficult to comment on.

Commonest finding during USG was collapsed gall bladder with increased wall thickness. It was present in above 50% of all types of hepatitis. Among HEV hepatitis it was present in 84% cases while it was present in all cases of HAV hepatitis. Wall thickness ranged from 4 mm to 18 mm. Eight patients were referred from surgery ward with diagnosis of acute cholecystitis with deranged liver biochemistry. Thicker the gall bladder, more elevated was the liver enzymes. Pericholecystic oedema was present in 51% of HEV hepatitis. Gall bladder sludge was present in less than 50% patients. Gall bladder findings were common in patients with high level of transaminase. However, these sonographic features turned out to be short-lived and reversible as they disappeared in most of the patients within 3 weeks of the first ultrasound examination. In 5 patients taking Ayurvedic medications it took more than one month. Forty percent of patients failed to attend OPD for follow up ultrasound. It was assumed that due to improvement they considered it unnecessary to revisit. Lymph nodes appeared hyperechogenic at the center with hypoechogenic outer layer in the hepatic hilum. It was more common in HAV hepatitis compared to HBV and HEV hepatitis. Anti HCV by ELISA was done in those cases having enlarged lymph nodes, as it is common in HCV hepatitis. All were negative. Ascites was present in 6 cases. Those cases were associated with ingestion of Ayurvedic medications and/or herbal medications for more than one-month time. Presence of chronic liver disease was suspected at the beginning due to presence of splenomegaly and ascites. Doppler flowmetry showed slight fall in portal velocity. Four patients were subjected to upper GI endoscopy and two patients showed grade I-II esophageal varices. However, repeat endoscopy in both of these patients after one month showed no varices. Transient portal hypertension was strongly suspected.

Table 1: Demographic variables.

	HEV (124)	**HAV (15)**	**HBV (6)**
Male	86 (69%)	10 (67%)	6 (100%)
Female	38 (31%)	5 (33%)	0
Age (years)	26 (15-75)	12 (6-54)	28 (20-42)

Table 2: Clinical presentation of the patients.

	HEV (124)	HAV (15)	HBV (6)
Jaundice	118 (95%)	15 (100%)	4 (67%)
Dark urine	110 (89%)	13 (86%)	4 (67%)
Fever	21 (17%)	3 (20%)	1 (17%)
Anorexia	120 (97%)	14 (93%)	6 (100%)
Nausea/vomiting	92 (74%)	12 (80%)	4 (67%)
Pain abdomen	85 (68%)	10 (67%)	1 (17%)
Pruritus	68 (55%)	5 (33%)	0
Arthralgia	5 (4%)	0	3 (50%)
Myalgia	12 (10%)	0	4 (67%)
Loss of consciousness	2 (1.6%)	0	0

Table 3: Laboratory parameters.

	HEV (124)	HAV (15)	HBV (6)
Total bilirubin (mg/dL)	15 (1.4-35.6)	11 (4.6-22.3)	16 (14.6-25)
Conjugated bilirubin (mg/dL)	12 (0.8-26.3)	8 (2.8-14)	12 (10.2-17.4)
Alanine transaminase (IU/L)	585 (78-2856)	476 (70-1825)	612 (98-1426)
Aspartate transaminase (IU/L)	458 (55-3045)	454 (84-1670)	298 (84-586)
Alkaline phosphatase (IU/L)	184 (126-1044)	278 (206-842)	172 (130-327)
Prothrombin time (Sec)	15 (12-45)	14 (12-16)	15 (12-25)

Table 4: Sonologic findings in acute hepatitis patients.

	HEV (124)	HAV (15)	HBV (6)
Hepatomegaly	68 (55%)	10 (67%)	3 (50%)
Splenomegaly	42 (34%)	6 (40%)	2 (33%)
Collapsed gall bladder	105 (84%)	15 (100%)	3 (50%)
Gall bladder wall thickening	105 (84%)	15 (100%)	3 (50%)
Pericholecystic oedema	64 (51%)	4 (27%)	2 (33%)
Gall bladder sludge	46 (37%)	2 (13%)	3 (50%)
Enlarged hilar node	16 (13%)	8 (53%)	2 (33%)
Ascites	6 (5%)	0	0

Discussions

In our country water borne viral hepatitis is more common than blood borne disease. Although mortality is less, it is associated with loss of quality of life. When contracted during third trimester of life there is significant mortality. Traditional belief of diet restriction, use of so called hepatoprotective herbal preparation and liver tonics, use of nasal irritant medications has been found to be associated with protracted course for recovery and more complications. Not only in East, use of herbal medications is growing popularity in West because of the belief that it has no side effect and it is healthful. However, there are reports of hepatotoxicity related to herbal medications[2,3]. Conversely, use of such drugs should not be practiced in acute viral hepatitis as they are self limiting if they don't go to liver failure. In this study, those patients who had already taken Ayurvedic medication before consultation showed high alkaline phosphatase level and AST indicating intrahepatic cholestasis. This may be due to presence of heavy metal compounds present in Ayurvedic preparations. Duration of illness was also prolonged. The problem must have been aggravated by dietary restriction imposed by alternative medicine practitioner and family members. Six cases showing ascites and two cases of transient portal hypertension were also associated with Ayurvedic medications. Thus, use of Ayurvedic medicines was found to aggravate the otherwise self-limiting disease of acute viral hepatitis.

Gall bladder findings were common in all type of hepatitis. Collapsed gall bladder with increased wall thickness and pericholecystic oedema were most consistent finding. Some patients were admitted in surgical ward with diagnosis of acute cholecystitis till jaundice appeared and were referred to liver clinic. These findings are consistent with findings from previous studies[4, 5, 6, 7, 8]. Several hypotheses have been proposed to explain the mechanism of gallbladder wall thickening in patients with acute hepatitis. One hypothesis is that gallbladder wall thickening, together with a decrease in gallbladder volume, occurs when hepatocyte injury at the time of onset of acute hepatitis causes a temporary decrease in bile production and excretion[9,10]. A second hypothesis is that gallbladder wall thickening is due to a direct injury to and inflammation of the mucosal and muscular layers of the gallbladder by hepatitis virus contained in bile juice[11]. This hypothesis is based on reports showing that hepatitis virus was detected in the bile juice of infected monkeys and that hepatitis A virus antigen was detected in the gallbladder and bile duct of patients diagnosed with hepatitis A and related acalculous cholecystitis[12, 13]. A third hypothesis is that hepatocyte necrosis, which is extensive in patients with acute hepatitis, causes an inflammatory reaction in the tissues surrounding the liver, including the gallbladder wall[5]. Role of lymphatic obstruction by virus cannot be ruled out. However, there is no data available to support this statement. Hypoalbuminemia, which may cause gall bladder wall thickening[14] was ruled out in cases showing increased wall thickness.

Thus, USG findings are present in most of the acute viral hepatitis. Gall bladder findings of increased wall thickness and pericholecystic oedema are very common. It can be used as auxiliary findings in case of acute viral hepatitis. When serological diagnostic facility is not available it can back up in the diagnosis when clinically acute hepatitis is suspected. These findings of gall bladder have recently been verified by more accurate technique of endoscopic ultrasonography[15].

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