Chapter 49

Assessment and Management of Patients With Hepatic Disorders

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True/False
1. The albumin to globulin ratio (normally 1.5 to 2.5) is reversed in liver disease.
2. Prothrombin time, normally 12 to 16 seconds) is decreased to 4 to 6 seconds in liver disease.
3. When fluid accumulates in the peritoneal cavity, the presence and extent of ascites are assessed by percussing the abdomen.
4. The hepatitis A virus is transmitted primarily parenterally through percutaneous and permucosal routes.
5. Benign liver tumors, such as hepatic adenomas, occur most frequently in women, in their reproductive years, who are taking oral contraceptives.

Review of Anatomy and Physiology

- Largest gland of the body
- Located in the upper right abdomen
- A very vascular organ that receives blood from GI tract via the portal vein (80% of blood supply, poor of oxygen) and from the hepatic artery (rich in oxygen)
Liver and Biliary System
Section of a Liver Lobule

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Cross Section of liver lobule

Common hepatic duct
Common bile duct
Stomach
Duodenum (first part of small intestine)
Common bile duct
Common hepatic duct
Left hepatic duct
Liver
Right hepatic duct
Gallbladder
Cystic duct

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Endoscopic retrograde cholangiopancreatography (ERCP) (cholangio = bile duct) is a technique that combines the use of endoscopy and fluoroscopy to diagnose and treat certain problems of the biliary or pancreatic ductal systems.
Assessment and Metabolic Function Studies

- Health history, gerontologic changes, refer to Chart 49-1
- OTC medications
- Pallor, jaundice
- Petechiae, erythema, angiomas
- Gynecomastia (↑ breast tissue in males)
- Neurologic status
- Glucose metabolism
- Ammonia conversion
- Protein metabolism
- Fat metabolism
- Vitamin and iron storage
- Bile formation, Bilirubin excretion
- Drug metabolism

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Petechiae is a small (1 – 2 mm) red or purple spot on the skin, caused by a minor hemorrhage (broken capillary blood vessels).

- **Angiomas** are **benign tumors** derived from cells of the vascular or lymphatic vessel walls (endothelium) or derived from cells of the tissues surrounding these vessels.
Question

Is the following statement true or false?

The majority of blood supply to the liver, which is poor in nutrients, comes from the portal vein.

Answer

False

The majority of blood supply to the liver, which is rich in nutrients from the gastrointestinal tract, comes from the portal vein.
Liver Function Studies

- Serum aminotransferase: AST, ALT, GGT, GGTP, LDH
- Serum protein studies
- Direct and indirect serum bilirubin, urine bilirubin, and urine bilirubin and urobinogen
- Prothrombin time
- Serum alkaline phosphatase
- Serum ammonia
- Cholesterol
- Refer to Table 49-1

AST, aspartate aminotransferase; ALT, alanine aminotransferase; GGT, gamma-glutamyl transferase; GGTP, gamma-glutamyl transpeptidase; LDH, lactate dehydrogenase; HDL, high-density lipoprotein; LDL, low-density lipoprotein.

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Bilirubin is the yellow breakdown product of normal heme catabolism, caused by the body’s clearance of aged RBCs which contain hemoglobin.

Bilirubin Transport
Additional Diagnostic Studies

- Liver biopsy
- Ultrasonography
- CT
- MRI
- Other
- Refer to Chart 49-2

CT scan
**FIGURE 49-13** Asterixis ("liver flap") may occur in hepatic encephalopathy. The patient is asked to hold the arm out with the hand held upward (dorsiflexed). Within a few seconds, the hand falls forward involuntarily and then quickly returns to the dorsiflexed position.

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• **Jaundice** (also known as **icterus**) caused by **high blood bilirubin levels**.
Hepatitis

- Viral hepatitis: a systemic viral infection that causes necrosis (death by autolysis) and inflammation of liver cells with characteristic symptoms and cellular and biochemical changes.
  - A and E: fecal-oral route
  - B and C: blood-borne
  - D: only people with hepatitis B are at risk
  - Hepatitis G and GB virus-C
- Nonviral hepatitis: toxic and drug induced

Hepatitis is easily transmitted and causes high morbidity and prolonged loss of time from school or employment.

Acute viral hepatitis affects 0.5% to 1% of people.

Refer to Table 49-4

**TABLE 49-4** Comparison of Major Forms of Viral Hepatitis
Hepatitis A

- Accounts for 20% to 25% of cases of clinical hepatitis.
- Caused by an RNA virus of the enterovirus family.
- Spread by poor hand hygiene; fecal–oral
- More prevalent in countries with overcrowding and poor sanitation.
- Can be transmitted during sexual activity; this is more likely with oral–anal contact or anal intercourse and with multiple sex partners

Incubation period is the time elapsed between exposure to a pathogenic organism, a chemical or radiation, and when symptoms and signs are first apparent.

DNA vs. RNA

- Deoxyribose as the sugar
- Ribose as the sugar
- Bases used: Thymine (T), Cytosine (C), Adenine (A), Guanine (G)
- Bases used: Thymine (T), Cytosine (C), Adenine (A), Guanine (G)
• Incubation: 15 to 50 days
• Illness may last 4 to 8 weeks
• Mortality rate is 0.5% for those younger than age 40 years and 1% to 2% for those older than age 40 years
• Most patients recover from hepatitis A; it rarely progresses to cirrhosis of the liver or death.
• By the time jaundice occurs, the patient is likely to be non infectious.
• Manifestations: mild flulike symptoms, low-grade fever, anorexia, later jaundice and dark urine, indigestion and epigastric distress, enlargement of liver and spleen.
If the liver's function is impaired or when biliary drainage is blocked, some of the conjugated bilirubin leaks out of the hepatocytes and appears in the urine, turning it dark amber.
Assessment and Diagnostic Findings

- Hepatitis A antigen may be found in the stool 7 to 10 days before illness and for 2 to 3 weeks after symptoms appear.
- HAV antibodies are detectable in the serum

Prevention

- Scrupulous hand hygiene, safe water supplies, and proper control of sewage disposal.
- Effective and safe HAV vaccines (95% to 100% after two to three doses)
- Two-dose vaccine given to adults 18 years of age or older (second dose given 6 to 12 months after the first.
- Children and adolescents 2 to 18 years of age receive three doses; the second dose is given 1 month after the first, and the third dose is given 6 to 12 months later.
Management of Hepatitis A

- Bed rest during acute stage
- Nutritional support
- Management usually occurs in the home unless symptoms are severe.

Chart 49-7

Health Promotion
Prevention of Hepatitis

Chart 49-8

Dietary Management of Hepatitis

- Recommend small, frequent meals; minimize periods without food intake.
- Provide intake of 25–30 kcal/day.
- Provide protein intake of 1–1.5 g/kg/day.
- Carefully monitor fluid balance.
- Be aware that that enteral feedings may be necessary if anorexia, nausea, and vomiting persist.
- Instruct patient to abstain from alcohol during acute illness and for at least 6 months after recovery.
- Advise patient to avoid substances (medications, herbs, illicit drugs, and toxins) that may affect liver function, such as St. John’s wort in patients taking hepatitis C virus protease inhibitors.
Hepatitis B

- Transmitted through blood, saliva, semen, and vaginal secretions; sexually transmitted; transmitted to infant at the time of birth
- Screening of blood donors has greatly reduced the occurrence of hepatitis B after blood transfusion.
- Long incubation period: 1 to 6 months
- Most people (more than 90%) with HBV develop antibodies and recover spontaneously in 6 months.
- A major worldwide cause of cirrhosis and liver cancer (10% of HBV)
- Manifestations: insidious and variable; similar to hepatitis A

Chart 49-9

RISK FACTORS

Hepatitis B

- Frequent exposure to blood, blood products, or other body fluids
- Health care workers: hemodialysis staff, oncology and chemotherapy nurses, personnel at risk for needlesticks, operating room staff, respiratory therapists, surgeons, dentists
- Hemodialysis
- Male homosexual and bisexual activity
- IV/injection drug use
- Close contact with carrier of hepatitis B virus
- Mother-to-child transmission
- Travel to or residence in area with uncertain sanitary conditions
- Multiple sexual partners
- Recent history of sexually transmitted infection
- Receipt of blood or blood products (e.g., clotting factor concentrate)
- Tattooing

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Assessment and Diagnostic Findings

HBV is a deoxyribonucleic acid (DNA) virus composed of the following antigenic particles:

- **HBcAg**—hepatitis B core antigen (antigenic material in an inner core)
- **HBsAg**—hepatitis B surface antigen (antigenic material on the viral surface, a marker of active replication and infection)
- **HBeAg**—an independent protein circulating in the blood
- **HBxAg**—gene product of X gene of HBV DNA

Each antigen elicits its specific antibody and is a marker for different stages of the disease process:

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Management of Hepatitis B

- Medications for chronic hepatitis type B include alpha interferon and antiviral agents: lamivudine (Epivir), adefovir (Hepsera)
- Bed rest and nutritional support
- **Vaccine**: for persons at high risk, routine vaccination of infants
  - Passive immunization for those exposed
  - Standard precautions and infection control measures
  - Screening of blood and blood products

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Hepatitis C

- Transmitted by blood and sexual contact, including needle sticks and sharing of needles
- The most common bloodborne infection
- A cause of one third of cases of liver cancer and the most common reason for liver transplant
- Risk factors: refer to Chart 49-10
- Incubation period is variable
- Symptoms are usually mild (The clinical course of acute hepatitis C is similar to that of hepatitis B)
- Chronic carrier state frequently occurs

Management of Hepatitis C

- Antiviral medications: interferon, ribavirin (Rebetol)
- Measures to reduce spread of infection as with hepatitis B
- Alcohol potentiates disease; medications that effect the liver should be avoided
- Prevention: public health programs to decrease needle sharing among drug users
- Screening of blood supply
- Safety needles for health care workers
Hepatitis D and E

- **Hepatitis D**
  - Only persons with hepatitis B are at risk
  - Blood and sexual contact transmission
  - Likely to develop fulminant liver failure or chronic active hepatitis and cirrhosis

- **Hepatitis E**
  - Transmitted by fecal–oral route,
  - Incubation period 15 to 65 days
  - Resembles hepatitis A; self-limiting, abrupt onset, not chronic

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Question

Is the following statement true or false?

Only persons with hepatitis B are at risk for hepatitis D.
Answer

True

Only persons with hepatitis B are at risk for hepatitis D.

Other Liver Disorders

- Nonviral hepatitis
  - Toxic hepatitis (certain chemicals, e.g., gold compounds)
  - Drug-induced hepatitis (e.g., acetaminophen), most common cause of acute liver failure; If fever, rash, or pruritus occurs from any medication, its use should be stopped immediately.

- Fulminant hepatic failure.
  - The clinical syndrome of sudden and severely impaired liver function in a previously healthy person.
  - The prognosis is much worse than for chronic liver failure.
Hepatic Cirrhosis

• Very important to refer to textbook for further details!!! (every detail here is important)

• Chronic disease characterized by replacement of normal liver tissue with diffuse fibrosis that disrupts the structure and function of the liver.

• Types
  - Alcoholic (most common type)
  - Postnecrotic (a late result of a previous bout of acute viral hepatitis)
  - Biliary (usually results from chronic biliary obstruction and infection (cholangitis); it is much less common)

• Pathophysiology: refer to Table 49-5

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• Alcohol intake is the major causative factor in fatty liver and its consequences.

• The destroyed liver cells are gradually replaced by scar tissue.

• The cirrhotic liver has a characteristic hobnail (مسمار النعل) appearance.

• The disease usually proceeds over a period of 30 or more years.

• Most patients are between 40 and 60 years of age.
hobnail (مسمار النعل) appearance.

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• Of the prognostic indicators, the Child-Pugh classification, useful in predicting the outcome of patients with liver disease.

<table>
<thead>
<tr>
<th>TABLE 49-5 Modified Child-Pugh Classification of the Severity of Liver Disease*</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Parameter</strong></td>
</tr>
<tr>
<td>Ascites</td>
</tr>
<tr>
<td>Bilirubin (mg/dL)</td>
</tr>
<tr>
<td>Albumin (g/dL)</td>
</tr>
<tr>
<td>Prothrombin time (seconds over control)</td>
</tr>
<tr>
<td>Encephalopathy</td>
</tr>
</tbody>
</table>

*Total score of 1–6, grade A; 7–9, grade B; 10–15, grade C.

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Child-Pugh classification interpretation

<table>
<thead>
<tr>
<th>Points</th>
<th>Class</th>
<th>One year survival</th>
<th>Two year survival</th>
</tr>
</thead>
<tbody>
<tr>
<td>5–6</td>
<td>A</td>
<td>100%</td>
<td>85%</td>
</tr>
<tr>
<td>7–9</td>
<td>B</td>
<td>81%</td>
<td>57%</td>
</tr>
<tr>
<td>10–15</td>
<td>C</td>
<td>45%</td>
<td>35%</td>
</tr>
</tbody>
</table>

- Manifestations: liver enlargement, portal obstruction, ascites, GI varices, edema, vitamin deficiency, anemia, mental deterioration (hepatic encephalopathy and hepatic coma);
- refer to Chart 49-11 (compensated vs. decompensated cirrhosis)
Ascites (an accumulation of fluid in the peritoneal cavity)

- GI varices

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• The hallmarks of decompensated cirrhosis result from failure of the liver to synthesize proteins, clotting factors, and other substances and manifestations of portal hypertension

Hepatic Encephalopathy

Most ammonia in the body forms when protein is broken down by bacteria in the intestines. The liver normally converts ammonia into urea, which is then eliminated in urine. Ammonia levels in the blood rise when the liver is not able to convert ammonia to urea. This may be caused by cirrhosis or severe hepatitis.
Liver Disease Leads to Elevated Ammonia

Healthy Liver
- Urea
- Ammonia
- Kidneys
- Gut

Diseased Liver
- Toxic increase in ammonia levels
- Hepatic encephalopathy
- Intracranial hypertension
- Astrocytic swelling
- Osmotic stress
- Cytotoxic brain edema
- Glutamine

PORTAL SYSTEMIC ENCEPHALOPATHY (PSE)
HEPATIC ENCEPHALOPATHY (HEPATIC COMA)

↑ Blood Ammonia

Problem ↑ By:
- ↑ Protein
- Infection
- Hypovolemia
- Hypokalemia (↓ K)
- GI Bleeding

Treatment
- Where Am I?
- Give Lactulose & Neomycin

Changes in LOC
- Progressive Confusion
- Stuporous
- Impaired Thinking & Judgment
- Neuromuscular Disturbances
- Asterixis “Liver Flap”
- Hyperreflexia

↓ Protein in diet

 Adapted from Jalan 2009 Gastroenterology

Ocera

Tranzyme Pharma
Portal Obstruction and Ascites

- Are caused partly by chronic failure of liver function and partly by obstruction of the portal circulation.
- Because a cirrhotic liver does not allow free blood passage, blood backs up into the spleen and the GI tract.
- Indigestion and altered bowel function result.
- Fluid rich in protein may accumulate in the peritoneal cavity, producing ascites.

Bacterial peritonitis may develop in the absence of an intra-abdominal source of infection. This condition is referred to as spontaneous bacterial peritonitis (SBP).

- Bacteremia due to trans-location of intestinal flora is believed to be the most likely route of infection.
- The most severe complication of SBP is hepatorenal syndrome, a form of renal failure unresponsive to administration of fluid or diuretic agents.
• Vitamin Deficiency and Anemia: because of inadequate formation, use, and storage of certain vitamins (notably vitamins A, C, and K) (K).

• Hemorrhage associated with vitamin K deficiency.

Assessment and Diagnostic Findings

• Very important table (49-1).

**TABLE 49-1  Common Laboratory Tests to Assess Liver Function**

• Enzyme tests indicate liver cell damage: serum alkaline phosphatase, AST, ALT, and GGT levels increase, and the serum cholinesterase level may decrease.

• Prothrombin time is prolonged. (PT is the same as INR)
Medical Management

- Management is based on the presenting symptoms.
- Potassium-sparing diuretic agents such as spironolactone may be indicated to decrease ascites, if present.
- An adequate diet and avoidance of alcohol.
- Although the fibrosis of the cirrhotic liver cannot be reversed, its progression may be halted or slowed.
- Many patients who have end-stage liver disease (ESLD) with cirrhosis use the herb milk thistle (Silybum marianum) to treat jaundice and other symptoms.

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**Nursing Process: The Care of the Patient With Cirrhosis of the Liver—Assessment**

- Focus: onset of symptoms, history of precipitating factors
- Alcohol use or abuse
- Dietary intake and nutritional status
- Exposure to toxic agents and drugs
- Assess changes in mental status, ADL and IADLs, job and social relationships
- Monitor signs and symptoms related to bleeding; changes in fluid volume and laboratory data

IADLs, instrumental activities of daily living e.g., managing finances, shopping, transportation.

**Nursing Process: The Care of the Patient With Cirrhosis of the Liver—Diagnosis**

- Activity intolerance
- Imbalanced nutrition
- Impaired skin integrity
- Risk for injury and bleeding
Collaborative Problems and Complications of Cirrhosis of the Liver

- Bleeding and hemorrhage
- Hepatic encephalopathy
- Fluid volume excess

Nursing Process: The Care of the Patient With Cirrhosis of the Liver—Planning

- Goals may include increased participation in activities, improvement of nutritional status, improvement of skin integrity, decreased potential for injury, improvement of mental status, and absence of complications
**Activity Intolerance**

- Rest and supportive measures
- Positioning for respiratory efficiency
- Oxygen
- Planned mild exercise and rest periods
- Address nutritional status to improve strength
- Measures to prevent hazards of immobility

**Imbalanced Nutrition**

- I&O
- Encourage small frequent meals
- High-calorie diet, sodium restriction
- Protein modified or restricted if patient is at risk for encephalopathy
- Supplemental vitamins, minerals, B complex, provide water-soluble forms of fat-soluble vitamins if patient has steatorrhea
- Consider patient preferences
Other Interventions

- Impaired skin integrity
  - Frequent position changes
  - Gentle skin care
  - Reduce scratching related to pruritus
- Risk for injury
  - Prevent falls, trauma related to risk for bleeding
True/False

1. The albumin to globulin ratio (normally 1.5 to 2.5) is reversed in liver disease. ✔
2. Prothrombin time, normally 12 to 16 seconds) is decreased to 4 to 6 seconds in liver disease. ✗
3. When fluid accumulates in the peritoneal cavity, the presence and extent of ascites are assessed by percussing the abdomen. ✔
4. The hepatitis A virus is transmitted primarily parenterally through percutaneous and permucosal routes. ✗
5. Benign liver tumors, such as hepatic adenomas, occur most frequently in women, in their reproductive years, who are taking oral contraceptives. ✔
Question

When caring for a patient with advanced cirrhosis and hepatic encephalopathy, which of the following assessment findings should the nurse report immediately?

a) Change in the patient’s handwriting and or cognitive performance.

b) Anorexia for more than 3 days.

c) Constipation for more than 2 days.

d) Weight loss of 1 kilogram in 3 days.

Answer

a. Change in the patient’s handwriting and or cognitive performance.

The earliest symptoms of hepatic encephalopathy include mental status changes and motor disturbances. The patient appears confused and unkempt and has alterations in mood and sleep patterns. Neurologic status should be assessed frequently. Mental status is monitored by the nurse keeping the patient’s daily record of handwriting and arithmetic performance. The nurse should report any change in mental status immediately. Chronic fatigue, anorexia, dyspepsia, nausea, vomiting, and diarrhea or constipation with accompanying weight loss are regular symptoms of cirrhosis.
**Question**

The nurse identifies which of the following types of jaundice in an adult experiencing a transfusion reaction?

a) Hepatocellular.
b) Hemolytic.
c) Obstructive.
d) Non-obstructive.

**Answer**

b. Hemolytic

Hemolytic jaundice occurs because, although the liver is functioning normally, it cannot excrete the bilirubin as quickly as it is formed. This type of jaundice is encountered in patients with hemolytic transfusion reactions and other hemolytic disorders. Obstructive jaundice is the result of liver disease. Non-obstructive jaundice occurs with hepatitis. Hepatocellular jaundice is the result of liver disease.
**Question**

Which of the following would be the most important nursing assessment in a patient diagnosed with ascites?

a) Palpation of abdomen for a fluid shift.  
b) Auscultation of abdomen.  
c) Daily weight and measurement of abdominal girth.  
d) Assessment of oral cavity for foul-smelling breath.

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**Answer**

c. Daily weight and measurement of abdominal girth.  

Daily measurement and recording of abdominal girth and body weight are essential to assess the progression of ascites and its response to treatment.
Thank You
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