Scenario C

Mr. Frick has a history of diverticulitis. He reports that he has intermittent diarrhea and left lower abdominal discomfort. He is admitted to the hospital for symptoms of nausea, vomiting, and severe abdominal pain and distention. Mr. Frick is diagnosed with peritonitis.

1. What signs or symptoms should you observe for that may signal worsening of his condition?
2. What medical orders do you anticipate that the physician will order to treat Mr. Frick's peritonitis?
3. Discuss general nursing interventions that would be appropriate for Mr. Frick.

chapter

31 Care of Patients with Disorders of the Gallbladder, Liver, and Pancreas

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Objectives

Theory

1. Explain the plan of care for the patient with cholelithiasis.
2. Describe treatment for the patient with cholecystitis.
3. List the ways in which the various types of hepatitis can be transmitted.
4. Identify signs and symptoms of the various types of hepatitis.
5. Devise appropriate nursing interventions for the patient with cirrhosis and ascites.
6. Indicate potential causes of liver failure.
7. Differentiate the signs and symptoms of acute and chronic liver failure.
8. Discuss the ethical issues associated with liver transplantation.
9. Devise a nursing care plan for the patient with cancer of the liver.
10. Prepare a plan for adequate pain control for the patient with pancreatitis.
11. Compare the treatment options for cancer of the pancreas.

Clinical Practice

1. Perform preoperative teaching for a patient who is to undergo laparoscopic cholecystectomy.
2. Review a nursing care plan, including psychosocial concerns, for the patient who has hepatitis with jaundice.
3. Implement a discharge teaching plan for the patient who has been in the hospital with a flare-up of chronic pancreatitis.

Key Terms

ascites (ă-SĪ-tēz, p. 701)
asterixis (ăs-tĕr-ĪK-sĭs, p. 707)
biliary colic (BĬL-ē-ăr-ē kō-LĬC, p. 691)
caput medusa (KĂP-ĕt mĕ-DŪ-să, p. 701)
cholecystectomy (kō-lĕ-sĭs-TĔK-tō-mē, p. 692)
cholecystitis (kō-lĕ-sĭs-TĪ-tĭs, p. 691)
choledocholithiasis (kō-lĕd-ō-kō-lĭ-THĪ-ă-sĭs, p. 690)
cholelithiasis (kō-lĕ-lĭ-THĪ-ă-sĭs, p. 690)
cirrhosis (sĭr-RŌ-sĭs, p. 701)
encephalopathy (ĕn-sĕf-ă-LŎP-ă-thē, p. 698)
esophageal varices (ē-sŏf-ă-JĒ-ăl VĂR-ĭ-sēz, p. 704)
fetor hepaticus (hĕ-PĂ-tĭ-kŭs, p. 707)
hematemesis (hē-mă-TĔM-ĕ-sĭs, p. 704)
hepatitis (hĕ-pă-TĪ-tĭs, p. 694)
icterus (ĪK-tĕr-ŭs, p. 702)
jaundice (JĂWN-dĭs, p. 691)
palmar erythema (ĕr-ĭ-THĒ-mă, p. 701)
paracentesis (păr-ă-sĕn-TĒ-sĭs, p. 702)
prodromal stage (prō-DRŌ-măl, p. 699)
pruritus (prū-RĪ-tŭs, p. 701)
pseudocyst (sū-dō-sĭst, p. 709)
spider angiomas (SPĪ-dĕr ăn-jē-Ō-măz, p. 701)

DISORDERS OF THE GALLBLADDER

CHOLELITHIASIS AND CHOLECYSTITIS

Etiology

Cholelithiasis is the presence of gallstones within the gallbladder or in the biliary tract. The stones may vary in size, from very small "gravel" to stones as large as golf balls. Tiny stones pass into the bile ducts, where they become lodged and obstruct bile flow (Figure 31-1). When stones lodge in the common bile duct, the patient has **choledocholithiasis.** Cholelithiasis is more likely to occur in people with a sedentary lifestyle, a familial tendency, diabetes mellitus, and obesity. Cholesterol-lowering drugs increase the amount of cholesterol secreted in bile. This cholesterol secretion can increase the risk of gallstones.

Cultural Considerations

Ethnic Predisposition to Gallstones

Native Americans are genetically more prone to develop gallbladder stones than any other group. Hispanic Americans have the next highest propensity to develop gallstones. Teaching dietary changes to decrease the amount of cholesterol and total fat in the diet may be an effective means of decreasing the incidence of gallstones in these populations (National Digestive Diseases Information Clearinghouse, 2007).

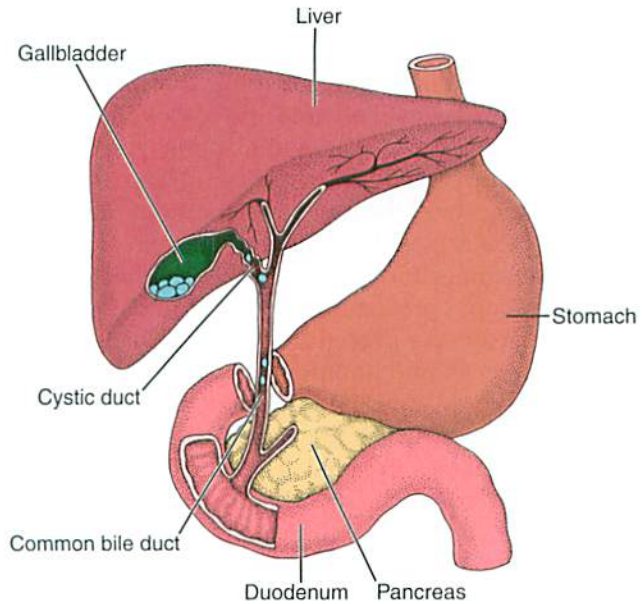


FIGURE 31-1 Gallstones within the gallbladder with obstruction of the common bile and cystic ducts.

Hemolytic disease, extensive resection of the bowel to treat Crohn's disease, bariatric surgery, or rapid weight loss, multiple pregnancies and use of oral contraceptives or hormone replacement therapy also increase the risk for gallstones.

Cholecystitis is an inflammation of the gallbladder and is associated with gallstones in 90% to 95% of occurrences. Other causes include obstructive tumors of the biliary tract and severely stressful situations such as cardiac surgery, severe burns, or multiple trauma.

Pathophysiology

Cholelithiasis (gallstones) develops when the balance between cholesterol, bile salts, and calcium in the bile is altered to the point that these substances precipitate. When cholesterol precipitates, the nucleus of a stone can be formed. The stone grows as layers of cholesterol, calcium, or pigment accumulate over the nucleus. Immobility, pregnancy, and obstructive lesions decrease bile flow. Stasis of bile leads to changes in chemical composition and stone formation. The formation of stones within the gallbladder can cause irritation and areas of inflammation in the gallbladder wall (cholecystitis). Infection can occur from organisms such as *Escherichia coli*. The organisms enter the gallbladder through the sphincter of Oddi from adjacent structures.

Signs and Symptoms

Symptoms depend on the degree of obstruction to bile flow and extent of inflammation of the gallbladder. The absence of bile in the intestine results in clay-colored stools that float as a result of undigested fat content. If a duct is obstructed by a stone, obstruction of bile flow by stones in the cystic or common bile duct causes strong muscle contractions that attempt to move the stones along; severe pain may be triggered by a fatty meal. Nausea and vomiting, fever, and leukocytosis occur with cholecystitis. Pain may be referred to the right clavicle, scapula, or shoulder. As bile backs up into the liver and blood, **jaundice** (yellow tint to skin and sclera) occurs. If obstruction is unrelieved, inflammation occurs, and can progress to liver damage.

The symptom most often present in an acute flare-up of chronic cholecystitis is unbearable upper right quadrant pain **(biliary colic).** The pain sometimes is referred to the back at the level of the shoulder blades. Attacks can occur as frequently as daily or may not appear but once every year or so. Vomiting may accompany acute flare-ups, along with chills and fever. If the inflammation is not corrected or if there is an infection, the gallbladder can become filled with pus and rupture. Rupture spills gallbladder contents into the abdominal cavity and causes peritonitis.

Chronic cholecystitis causes milder symptoms between acute attacks. Symptoms are indigestion after eating fatty foods, flatulence, nausea after eating, and some discomfort in the right upper quadrant. Table 31-1 compares signs and symptoms of gallbladder disorders.

? Think Critically

What questions would you ask when assessing a patient who might have cholecystitis?

Table 31-1 Comparison of Gallbladder Disorders

SIGN/SYMPTOM	CHOLELITHIASIS	ACUTE CHOLECYSTITIS	CHRONIC CHOLECYSTITIS
Pain/biliary colic	Sudden onset, acute	Waves of pain lasting 2-6 hr	Intermittent during the year; pain often referred to back at shoulder blade
Nausea, vomiting	Often present	Frequent	During acute attack
Indigestion and flatulence	—	—	Frequent complaint
Low-grade fever	Present	Present, often with chills	Present
Jaundice	If duct is obstructed	May be present	May be present during attack

Elder Care Points

Cholelithiasis should be considered in any elderly patient with abdominal pain when another cause cannot be found. Symptoms may be atypical and the presenting symptom of cholecystitis in this age group may be low-grade fever rather than pain.

Diagnosis

Gallstones usually can be diagnosed with ultrasonography or computed tomography (CT) of the gallbladder and biliary tract. Endoscopic retrograde cholangiopancreatography (ERCP) may be done to detect common duct stones. Cholescintigraphy (hepatoiminodiacetic acid [HIDA] scan) diagnoses abnormal contraction of the gallbladder or obstruction. Liver function tests are helpful to diagnose gallbladder and biliary tract disease. Alanine aminotransferase (ALT) and aspartate aminotransferase (AST) will be slightly elevated. If there is common duct obstruction, gamma-glutamyl transpeptidase is elevated. In biliary obstruction, both direct bilirubin and alkaline phosphatase levels are elevated.

The diagnosis of cholecystitis is aided by indicators of infection, such as elevated white blood cell count and sedimentation rate.

Treatment

First, a low-fat diet, loss of excessive body weight, and restriction of alcohol intake are recommended and meals are spaced so that no large amounts of food are put into the intestinal tract at any one time. This avoids overstimulation of gallbladder activity. If the patient does not respond to this therapy or if bile obstruction occurs, correction of the obstructed biliary tract is indicated. Antibiotics are usually only given if peritonitis is present. Fluids are administered and electrolytes are rebalanced.

Nutrition Considerations

Postcholecystectomy Diet

If obesity is present, a reduced calorie, low-fat diet may be prescribed for the first 4 to 6 weeks after surgery. Foods to be avoided include whole milk, cream, butter, cheese made from whole milk, ice cream, nuts, fried foods, rich pastries, and gravies. Small frequent meals are helpful. Keeping a record of foods eaten and symptom occurrence will indicate other foods that may be a problem for a particular patient.

If stones may be in the common bile duct, it is explored either before or during surgery. Sometimes small stones may be removed during ERCP, in which the common duct can be visualized. The surgical procedure of choice is **cholecystectomy** (gallbladder removal). Laparoscopic cholecystectomy is the most common surgical procedure used. Four small incisions are made in the abdomen; abdominal muscles are not cut, and the patient experiences less pain and a quicker recovery than with an "open" cholecystectomy. A laparoscope with an attached camera and a dissecting laser are used along with grasping forceps. Carbon dioxide (CO_2) is instilled into the abdominal cavity to aid visualization. The gallbladder is removed through the incision at the umbilicus. The patient will have dressings over the four small incisions on the abdomen. There is essentially no difference in complications or outcomes for either open cholecystectomy or the laparoscopic procedure. Recovery time is shorter for the laparoscopic procedure (Thomas, 2009).

The nurse should monitor the laparoscopic patient closely for internal bleeding and watch for signs of increasing abdominal rigidity and pain, and for changes in vital signs. Sometimes the retained CO_2 used during a laparoscopic procedure causes "free air" pain. Early and frequent ambulation helps the CO_2 gas dissipate. The patient is discharged after recovering from the anesthesia, or 1 day postoperatively, depending on his age and condition, and must have careful discharge teaching about signs of complications.

Patient Teaching

Postoperative Laparoscopic Cholecystectomy

Teach the patient to:

- Remove the bandages from the puncture sites the day after surgery and shower.
- Report the following signs and symptoms if they occur:
  - Redness
  - Swelling
  - Bile-colored drainage or pus from any surgical site
  - Severe abdominal pain
  - Nausea, vomiting, chills, or fever
  - Light-colored stool, dark urine, or yellow tint to the eyes or skin as these signs may indicate obstruction to the flow of bile
- Resume normal activities gradually.
- Expect that return to work is probable at 1 week postsurgery.
- Stick to a low-fat diet for several weeks, slowly introducing fattier foods to determine if they cause unpleasant symptoms.

With an open abdominal cholecystectomy, a 2- to 4-day stay in the hospital is usual and there is about a 6-week recovery period. Residual stones can lodge in the common duct after cholecystectomy. ERCP is usually used to remove residual stones.

Oral dissolution therapy is available and works best on small cholesterol stones. Ursodiol (Actigall) and chenodiol (Chenix) are prescribed for 6 months to 2 years to dissolve stones.

An experimental procedure called *contact dissolution therapy* involves injecting a drug, methyl *tert*-butyl ether, into the gallbladder to dissolve stones in 1 to 3 days. It can cause irritation and complications. It is being tested on patients with small stones

(National Digestive Diseases Information Clearinghouse, 2007).

Lithotripsy, or "shock wave" therapy, is occasionally used for gallstones. The procedure involves using sound waves directed through the body to break up the stones. The procedure takes 1 to 1½ hours, and the debris is then carried by the bile into the intestine. To be a candidate for this procedure, there must be no more than three cholesterol gallstones, each smaller than 1½ inches, and the patient must not be obese.

Nursing Management

Preoperative Care. Preoperatively, the gallstone patient may have a nasogastric tube to relieve nausea and vomiting. An analgesic may be ordered to decrease pain, and antiemetics are given for nausea.

Clinical Cues

In the recent past, morphine was not used because it was thought to cause spasm of the sphincter of Oddi; however, this is not supported by research (Carroll, 2009).

Intravenous (IV) fluids are begun to prevent dehydration. Coagulation times are monitored if jaundice is present, and vitamin K, if needed, is administered before surgery to improve clotting ability of the blood. The patient scheduled for gallstone surgery has needs similar to those of any patient having abdominal surgery. Teaching is adapted for the standard procedure or the laparoscopic procedure (see Chapters 4 and 5).

Postoperative Care. The patient is placed in the semi-Fowler's position after he recovers from anesthesia. This position is more comfortable and decreases strain on the sutures. The patient will also be able to take deep breaths and cough more easily in this position.

A patient who has had "open" gallbladder surgery needs proper care of the drains or tubes that may be in place after the surgery. In many cases, the surgery was performed to relieve an obstruction to the flow of bile through the bile ducts or to drain purulent material to the outside. The drainage is absorbed by the dressings over the surgical wound. Dressings must be changed often and should be checked frequently for signs of fresh bleeding. The drain is left in as long as necessary and is then removed by the surgeon.

When an obstruction of the common bile duct has occurred because of stones or tumors, the surgeon may insert a small T-shaped tube (T-tube) directly into the common bile duct during an "open" cholecystectomy (Figure 31-2). This tube must be kept open at all times and is connected to a bedside drainage bag. The length of time the T-tube is left in place varies according to the condition of the patient. Only a small amount of bile will be going to the duodenum. No tension should be put on tubes or drains that have been

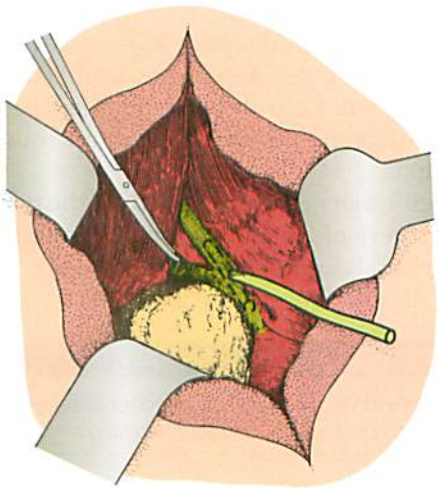


FIGURE 31-2 T-tube inserted into the common bile duct and sutured in place.

inserted in the surgical wound. Dressings must be changed carefully because **T-tubes are sutured in place, and if they are accidentally pulled out, the patient must be returned to the operating room and the incision reopened to replace the tube.**

Montgomery straps are best for holding the dressings in place. The patient should be prepared to expect a greenish yellow discharge (bile) on the dressings. The drainage bag is emptied when the dressing is changed. The patient often goes home with the T-tube in place.

Patient Teaching

Caring for a T-Tube

Teach the patient to:

- Wear loose-fitting, older clothes.
- Coil the drainage tubing and secure it to the abdomen with tape.
- Take showers rather than baths.
- Avoid heavy lifting and strenuous activity.
- Carefully change the dressing every day, cleansing the skin around the tube.
- Inspect for signs of infection: redness, swelling, warmth, pain, or pus.
- Take your temperature every day and report to surgeon if greater than 100° F (37° C).
- Empty the drainage bag at the same time each day.
- Note the amount, color, and odor of the drainage.
- Report any change in drainage, abdominal pain, nausea, or vomiting to your surgeon.
- Return to the surgeon for your follow-up checkup.

The nurse must carefully observe the color of the patient's stools because a return of the normal brown colored stool is an indication that bile is flowing and entering the small intestine. If the bile duct is obstructed, there will be signs of jaundice and stool will be light in color.

The "open" cholecystectomy patient is reluctant to deep-breathe and cough because of pain in the operative

area. Encourage these exercises, and auscultate lung sounds every shift to discover any signs of extra secretions or atelectasis. A patient-controlled analgesia (PCA) pump will help the patient to cooperate with turning, coughing, and ambulating and thus prevent complications.

No specific diet is recommended for the patient who has had surgery of the gallbladder, although it is wise to avoid excessive amounts of fatty foods.

Think Critically

Can you outline the points to be covered for teaching the patient who is about to undergo a cholecystectomy?

Complications

Constant irritation of the gallbladder may contribute to cancer of the gallbladder. Inflammation and infection produce purulent material and a fistula may form. Necrosis, gangrene, and rupture of the gallbladder causing peritonitis may occur. Choledocholithiasis may cause inflammation of the common duct and obstruct the pancreatic duct. This can lead to pancreatitis.

DISORDERS OF THE LIVER

The liver becomes inflamed when injured by trauma, toxins, or tumor invasion. Disruption of the normal functions of the liver occurs depending on how much of the liver tissue is affected. Chronic inflammation causes fibrosis of the liver cells and abnormal function.

HEPATITIS

Etiology and Pathophysiology

There are five types of viral **hepatitis** (Table 31-2) that cause physical problems. A sixth hepatitis virus, hepatitis G, does not seem to cause the symptoms of hepatitis. Liver cells are damaged either by direct action of the virus on hepatocytes or by cell-mediated immune responses to the virus. Hepatitis viruses cause extensive inflammation of the liver tissue. Liver cell damage results in necrosis of hepatic cells. The Kupffer cells proliferate and enlarge. Bile flow may be interrupted because of the inflammation. With severe inflammation, fibrous scar tissue may form in the liver. Scar tissue often obstructs normal blood and bile flow, causing further damage from ischemia.

Liver cells do have the capacity to regenerate and resume their normal appearance. The cells can function as long as there are no complications.

Hepatitis A and hepatitis E viruses are transmitted primarily by the oral-fecal route. They are responsible for the epidemic forms of viral hepatitis. Hepatitis A virus can be transmitted by food handlers to customers or by mollusk shellfish from contaminated waters. Hepatitis E virus infection is primarily seen in less developed countries. It is transmitted through fecal contamination of water.

Hepatitis B, C, and D viruses may cause chronic inflammation and necrosis of the tissue. A carrier state of hepatitis B, C, or D may occur and asymptomatic individuals can transmit infection to others. **Hepatitis B and C viruses are transmitted by parenteral routes and sexually as they are present in semen, vaginal secretions, and saliva of carriers. Sexual partners of patients who are carriers of hepatitis B or C virus are at high risk for contracting the virus.** Hepatitis D virus coexists with hepatitis B or C virus, and is transmitted in the same ways.

Hepatitis C virus has been the main cause of post-transfusion hepatitis because before 1992 donor blood could not be screened for this type of hepatitis. The number of transfusion-related cases was reduced after screening was implemented. **Intravenous drug use is currently a major cause of hepatitis C infection; therefore users are a target group for screening and counseling. The virus can also be transmitted by straws used to snort cocaine.** Hepatitis B and C viruses can be transmitted from mother to infant. Both can occur in hemodialysis patients. **Hepatitis B and C are the most serious forms of hepatitis, often progressing to chronic hepatitis, cirrhosis, liver cancer, and death.**

Cultural Considerations

HBV Among Asian Americans

One of 10 foreign-born Asian Americans has chronic HBV infection; in other words, the rate is 100 times greater than that of the non-Asian population (Mosby's Nursing Consult, 2008).

Elder Care Points

Elderly patients who have had several major surgeries and blood transfusions before 1992 are at higher risk for hepatitis B and C. These patients may be carriers of these viruses.

Signs and Symptoms

The clinical signs and symptoms of hepatitis A tend to have an acute onset, whereas in hepatitis B, hepatitis C, and hepatitis D the onset is slower and more insidious. There are three phases of hepatitis A. The first, the *preicteric* phase, precedes jaundice and lasts 1 to 21 days. When symptoms do occur, they may be vague and nonspecific manifestations (see Table 31-2.) The patient might think he has a mild case of influenza because the symptoms are so similar.

The *icteric* phase, characterized by jaundice, lasts 2 to 4 weeks. Urine becomes dark and stools may become light if bile flow is obstructed. Pruritus may occur from the bile pigment deposited in the skin. The liver becomes tender and enlarged.

Table 31-2 Comparison of Hepatitis-Causing Viruses

HEPATITIS A VIRUS (HAV)	HEPATITIS B VIRUS (HBV)	HEPATITIS C VIRUS (HCV)	HEPATITIS D VIRUS (HDV)	HEPATITIS E VIRUS (HEV)
Transmission Mode				
Fecal-to-oral route; poor sanitation and contaminated water and shellfish; often from infected food	Sexual contact, blood and body fluid contact; perinatal from mother to infant	Contact with blood and body fluids, sexual contact with carrier, contact with contaminated surgical, tattooing, and piercing equipment	Blood and body fluid contact; accompanies hepatitis B; close personal contact	Fecal-to-oral route; contaminated water or food
Incubation Period				
15-60 days (average 30 days)	6 wk-6 mo (average 12-14 wk)	6-7 wk	Same as hepatitis B, which precedes it. Chronic carriers of hepatitis B are at risk throughout their carrier state	14-60 days (average 40 days)
Infective Period				
Most infectious 2 wk before onset of symptoms; not likely to be infectious after first week following onset of jaundice	Begins before symptoms appear and persists for 4-6 mo after acute illness; persists for lifetime of chronic carriers	Begins 1-2 wk before symptoms appear; continues throughout life for chronic carriers	Blood is potentially infectious in active hepatitis B infection; may still be present in blood of chronic hepatitis B carriers even though undetectable	
Signs and Symptoms				
Acute onset *First phase (preicteric):* Malaise, fever, loss of appetite, nausea, fatigue, joint aching, skin rash, and upper abdominal discomfort May develop jaundice; malaise and fatigue	Slow onset May be asymptomatic	Slow onset May be asymptomatic until liver damage has occurred	Slow onset May be asymptomatic	Abdominal pain, anorexia, dark urine, fever, hepatomegaly, jaundice, malaise, nausea and vomiting

The *posticteric* phase begins when jaundice is disappearing. Convalescence may take 2 to 4 months. Major complaints are malaise and fatigue. Liver enlargement may continue, but if the spleen was enlarged, it returns to normal in this phase.

For chronic hepatitis B and C, patients are likely to be asymptomatic or have symptoms of chronic liver disease. Acute hepatitis B and C patients could also be asymptomatic. Symptoms include fatigue, nausea, vomiting, poor appetite, right upper quadrant pain, dark urine, and light-colored stools.

Hepatitis D sometimes causes massive destruction of liver cells, liver failure, and death. Hepatitis B and D become chronic in 2% to 10% of infected patients. The patient is then a constant carrier of the virus. There are no currently known signs and symptoms of hepatitis G.

Clinical Cues

We often assume that liver disorders are associated with jaundice; however, be aware that viral hepatitis without jaundice (anicteric hepatitis) is two to three times more common than viral hepatitis with jaundice.

Diagnosis

Hepatitis is diagnosed by history, physical examination, and laboratory testing. Serologic assays or enzyme immunoassays (EIAs) detect specific antibodies to the various types of hepatitis. Molecular assays can detect viral nucleic acid. These assays do not measure the severity of disease or indicate prognosis. The genotype assay can be used to predict the response to and duration of therapy. Chronic hepatitis is determined by liver biopsy. Elevations in liver function tests (LFTs) are

Table 31-3 Laboratory Test Findings in Acute Viral Hepatitis

TEST	ABNORMAL FINDINGS
Aspartate aminotransferase (AST)	Elevated in preicteric phase up to 20 times normal; decreases as jaundice subsides
Alanine aminotransferase (ALT)	Elevated in preicteric phase; ALT/AST ratio is greater than 1; decreases as jaundice subsides.
Gamma-glutamyl transpeptidase (GGT)	Elevated
Bilirubin	Elevated unconjugated (direct) bilirubin
Alkaline phosphatase	Some elevation
Serum albumin	Normal or decreased
Serum bilirubin (total)	Elevated to about 8-15 mg/dL (137-257 µmol/L)
Prothrombin time	Prolonged

expected findings (Table 31-3). Abnormalities in the white blood cell count, platelets, alkaline phosphatase, albumin, and prothrombin time may also occur depending on the severity of the disease.

Treatment

There is no specific treatment for acute viral hepatitis. Hepatitis A is treated by rest and avoidance of any substances, including alcohol, which can cause liver damage. These measures help the liver to regenerate. A well-balanced diet helps liver cells to heal. Four to six small meals a day are tolerated more readily than three larger ones. Sucking on hard candy is recommended and adds to caloric intake. Nausea may be treated with dimenhydrinate (Dramamine) or trimethobenzamide (Tigan). Phenothiazines are not used because of their hepatotoxic effects. People who have been exposed to the patient should be notified so they can receive prophylaxis.

For hepatitis B, drug therapy is used to decrease the viral load, thereby decreasing the disease progression (Table 31-4). In 2008 the Food and Drug

Table 31-4 Selected Drugs Commonly Prescribed for Disorders of the Liver

CLASSIFICATION	ACTION	NURSING IMPLICATIONS	PATIENT TEACHING
Diuretic			
Potassium-Sparing Diuretics			
Spironolactone (Aldactone) Amiloride (Midamor) Triamterene (Dyrenium)	Blocks action of aldosterone in the distal nephron, preventing sodium uptake in exchange for potassium secretion. Potassium is "spared" (not secreted) and sodium is excreted. These drugs cause little diuresis.	It is not necessary to supplement potassium for patients taking this type of diuretic alone. Monitor potassium levels.	Avoid foods high in potassium content: bananas, oranges, salt substitutes, dried apricots, and dates.
Loop Diuretic			
Furosemide (Lasix)	Blocks reabsorption of sodium and chloride in the loop of Henle, promoting water secretion. Promotes powerful diuresis.	Give early in the morning. Monitor potassium levels and supplement. potassium as needed Monitor for hypokalemia, I&O. Weigh patient daily. Assess for hearing loss. Monitor for postural hypotension.	Warn that the drug will cause the need to empty the bladder frequently. Caution regarding dizziness when changing positions.
Laxative: Ammonia Detoxicant			
Lactulose (Cephulac)	Prevents absorption of ammonia in the colon; increases water in the stool.	Assess stool amount and color. Monitor serum ammonia level, electrolytes, and I&O. Assess perineal skin frequently for excoriation from diarrhea.	Advise that this drug is intended to cause bowel evacuation and diarrhea is likely.

BP, blood pressure; *GI*, gastrointestinal; *HBV*, hepatitis B virus; *HCV*, hepatitis C virus; *I&O*, intake and output; *INR*, international normalized ratio.

Table 31-4 Selected Drugs Commonly Prescribed for Disorders of the Liver—cont'd

CLASSIFICATION	ACTION	NURSING IMPLICATIONS	PATIENT TEACHING
Antibiotic			
Neomycin (Mycifradin)	Decreases protein synthesis in bacterial cells, causing bacterial death. This prevents the breakdown of protein in the GI tract and helps prevent formation of ammonia.	Monitor renal function and hearing. Observe for dehydration.	Explain the purpose of this drug.
Vasoconstrictor			
Vasopressin (Pitressin)	Causes vasoconstriction; stops bleeding of esophageal varices.	Monitor BP and I&O as may cause water retention.	Explain the purpose of the drug.
Vitamins			
Thiamine (vitamin B_1)	Corrects vitamin B_1 deficiency that occurs from excessive alcohol use.	Assess thiamine levels.	Explain purpose of the drug.
Vitamin K (AquaMEPHYTON)	Needed for hepatic formation of coagulation factors II, VII, IX, and X.	Monitor prothrombin time and INR.	Explain injection may cause discomfort.
Antiretrovirals			
Lamivudine (Epivir)	Inhibits replication of HBV.	Monitor blood count, viral load, liver functions, amylase, lipase, and triglycerides. Watch for signs of lactic acidosis.	GI complaints and insomnia resolve after 3-4 wk. Drug is not a cure, but will help control symptoms. Notify physician of swollen lymph nodes, fever, malaise, and sore throat. May still pass virus on to others; maintain precautions.
Ribavirin (Rebetol)	Inhibits viral protein synthesis.	Ribavirin is used together with interferon alfa-2b to treat chronic HCV.	Drug may cause fainting or dizziness.
Adefovir dipivoxil (Hepsera)	Prevents DNA replication.	Monitor respiratory status; assess for skin rash.	Report any difficulty breathing or itching, swelling, or redness of the eyes.
Entecavir (Baraclude)	Prevents viral replication.	Monitor renal function.	May cause weakness.
Telbivudine (Tyzeka)	Prevents viral replication.	Monitor renal function and electrolytes.	May cause lactic acidosis and myopathy.
Tenofovir (Viread)	Prevents viral replication.	Monitor renal function and electrolytes.	May cause lactic acidosis and severe hepatomegaly.
Immunomodulator			
Peginterferon alfa-2b (PEG-Intron)	Inhibits viral replication and increases phagocytic action of macrophages, augmenting specific cytotoxicity of lymphocytes.	Perform baseline assessments. Monitor for signs of depression; offer emotional support. Monitor for abdominal pain and bloody diarrhea. Monitor viral load.	Maintain hydration and avoid alcohol. May experience flulike symptoms.
Antimetabolites Neoplastic Metabolites			
5-Fluorouracil (5-FU) and floxuridine (FUDR)	Antimetabolite that acts during cellular metabolism to prevent cellular division.	Perform baseline assessments with attention to temperature. Monitor blood count.	Avoid crowds and exposure to infection. Promptly report fever, diarrhea, vomiting, bleeding, bruising, or redness and burning of the palms of hands or soles of feet.

Administration (FDA) approved a once-daily tablet, tenofovir disoproxil fumarate (Viread), for the treatment of chronic hepatitis B. It works by blocking an enzyme required for replication of the virus. The most common side effect is nausea. Chronic hepatitis C virus treatment is also aimed at reducing the viral load. Treatment is supportive to enhance the patient's natural defenses and promote healing of the liver. Hydration, sufficient rest, and adequate nutrition are the goals. Medication for nausea may be prescribed to encourage adequate nutrition. Vaccines are available to provide active immunity against hepatitis A and B. The vaccine for hepatitis A is administered in two doses, 6 months apart, for lifetime immunity (Dentinger, 2009). The vaccine for hepatitis B produces immunity in about 95% of vaccinated individuals (Degli-Esposti, 2010) and is administered in three or four doses for probable lifetime immunity (MMWR Quick Guide, 2010).

Passive immunity to type A hepatitis can be conferred by the administration of immune globulin (IG). IG is also recommended for those who have been exposed to persons infected with hepatitis B virus who have not been immunized against this virus. There is no protective vaccine for hepatitis C virus.

Health Promotion

Healthy People 2020 Goal for Hepatitis B

Hepatitis is an occupational hazard for all people who have direct contact with patients or surgical and diagnostic equipment. Standard Precautions must be observed at all times. All health care personnel should be immunized with the hepatitis B vaccine. These practices will help meet the *Healthy People 2020* goal of reducing hepatitis B and the National Patient Safety Goal to reduce the risk of health care–associated infections.

NURSING MANAGEMENT

Assessment (Data Collection)

Data collection for a patient with hepatitis should include a nursing history of any previous contacts and whether the contacts have been notified and immunized. By law, viral hepatitis must be reported to the state department of public health. **Because the liver detoxifies many chemicals and metabolizes certain drugs, a complete list of recently taken or current medications is essential. It may be necessary to discontinue some drugs that are particularly toxic to the liver** (see Box 28-1).

Assess for problems related to silent gastrointestinal (GI) bleeding, respiratory distress, and neurologic dysfunction. Mental confusion and coma associated with hepatic encephalopathy occurs from circulating toxins due to liver failure. **Encephalopathy** is degeneration or disease of the brain.

Focused Assessment

Data Collection for the Patient with a Liver Disorder

HEALTH HISTORY

- Have you ever had a parasitic infection?
- Do you have a history of cancer?
- How much alcohol do you drink?
- Do you have a history of hepatitis?
- Have you been exposed to hepatitis?
- What drugs do you take?
- Have you been exposed to pesticides or industrial chemicals? Which ones?
- Has your appetite decreased? Have you had nausea or vomiting?
- Are you more fatigued than usual?
- Have you noticed any fever?
- Have you noticed dark-colored urine?
- Have you had any light or clay-colored stools?
- Have you had excessive gas?
- Have you been bruising easily?
- Has your skin been itchy or made you feel uncomfortable?
- Has your abdomen increased in girth lately?
- Do you have abdominal pain? Where? Can you describe it?
- Have you gained weight recently?

PHYSICAL ASSESSMENT

- Inspect the skin for signs of jaundice, scratch marks, and general condition.
- Inspect the sclera and mucous membranes of the mouth for signs of jaundice.
- Gently palpate the abdomen for masses and for liver enlargement.
- Auscultate bowel sounds.
- Measure abdominal girth for a baseline.
- Inspect extremities for signs of edema.
- Check liver function test values and urinalysis for bilirubin presence.

Nursing Diagnosis and Planning

Nursing diagnoses specific to hepatitis infection might include:

- Imbalanced nutrition: less than body requirements related to anorexia, nausea, and vomiting
- Fatigue related to disease process and malaise
- Pain related to inflamed liver and pruritus
- Deficient knowledge related to disease process and self-care needed
- Deficient diversional activity
- Disturbed body image related to yellow discoloration of skin

Expected outcomes might be:

- Patient will maintain body weight within normal limits during illness.
- Patient will verbalize lessened fatigue after rest periods each day.
- Patient will verbalize a decrease in pain after pain medication and comfort measures.
- Patient will verbalize knowledge of disease process and self-care within 2 days.
- Patient will engage in appropriate diversional activities during convalescence.
- Patient will list personal strengths that compensate for altered appearance.

Elder Care Points

The elderly patient is at higher risk for drug-induced hepatitis if he has chronic conditions that require the administration of various drugs that can cause liver damage over a long period of time. With liver inflammation, the liver will not function well and drug dosages will need to be lowered; otherwise drug toxicity may occur.

Implementation and Evaluation

Nursing interventions include reviewing trends of serum liver enzyme levels and serum bilirubin values. Preventing the spread of infection is a major concern when caring for patients with viral hepatitis. The patient and family will need to be instructed regarding special precautions to prevent the spread of the infection, such as proper handling of body secretions, proper hand hygiene, and limiting contact with others.

Sedatives must be given with caution because a diseased liver cannot detoxify them very well. Alcohol is particularly damaging to the liver and should be avoided for 4 months following recovery from hepatitis.

The convalescence of the hepatitis patient is slow and long. A nutritious diet with supplements is prescribed. A variety of diversional activities that are not physically taxing should be planned, such as a new hobby or learning a new skill, handheld computer games, Internet access, puzzle books, and DVDs. Visitors can play cards or board games with the patient. Nursing interventions for selected nursing diagnoses relevant to the patient with hepatitis are found in Table 31-5 and Table 28-2.

Complementary and Alternative Therapies

Promoting Good Liver Function

Several supplements are known to be beneficial to promoting good liver function. *N*-acetylcysteine (NAC), glutathione (GSH), choline, methionine, milk thistle, carnitine, and antioxidants are helpful. NAC promotes detoxification pathways; choline helps prevent deposition of fat in the liver. Carnitine allows fats to be used as energy and alleviates deposition of fat in the liver and elsewhere in the body. The physician should always be consulted before taking supplements.

Prevention

Transmission Precautions. Both feces and blood of patients with hepatitis A contain virus during the **prodromal stage** (infected but asymptomatic) and early symptomatic stage. When hepatitis is suspected, adherence to Standard Precautions is essential; patient and family must use precautions at home.

Hepatitis B and D viruses are rarely transmitted by the fecal-oral route, but it is strongly recommended to be very careful when disposing of a patient's stool. Standard Precautions guidelines must be carefully followed for handling, sterilizing, and disposing of equipment contaminated with blood. Hepatitis viruses are transmitted by sexual contact, and homosexual men in particular are at risk.

When a patient with viral hepatitis has been admitted to the hospital, the infection control officer must be notified as soon as possible. It is important to familiarize yourself with the hospital's policies and procedures, so that protection for others and follow-up for the infected patient is not overlooked. Infection with hepatitis A in a person who handles food on the job must be reported promptly. The Centers for Disease Control and Prevention (CDC) has published guidelines for the care of patients hospitalized with hepatitis. These same guidelines can be modified for home care to prevent the spread of the infection.

Home Care Considerations

Preventing the Spread of Hepatitis Virus

HEPATITIS A

- Notify close contacts so they can obtain immune globulin protection and hepatitis A vaccine.
- Practice extremely good hygiene, washing with warm water and soap (liquid soap is best).
- Wash hands after using the toilet and before eating and after changing diapers.
- Avoid preparing food during the infectious period.
- Use separate bath and hand towels from other members of the family.
- Avoid sharing toothbrushes.
- Use gloves to disinfect the bathroom fixtures with a 10:1 bleach solution.
- Refrain from sexual contact until the physician states that the infectious period is over.

HEPATITIS B OR C

- Avoid sexual contact until there is no chance of transmission of the virus.
- Advise close contacts to obtain hepatitis B vaccine as indicated.
- Avoid sharing razors or toothbrushes because of the chance of blood transmission.

Safety Alert

Hepatitis C

Hepatitis C virus (HCV) is transmitted by blood and saliva. Standard Precautions and careful handling of all body fluids are recommended. The first line of defense is scrupulous hand hygiene. Wear gloves when handling plasma-containing body fluids and use extreme caution when handling used needles, syringes, and IV tubing. Needle sticks, open wounds, and the mucous membranes of the eyes, nose, and mouth can serve as portals of entry. Dentists, physicians, nurses, and other health care workers must be informed of a patient's carrier status.

Table 31-5 Common Nursing Diagnoses, Expected Outcomes, and Nursing Interventions for Patients with Hepatitis

NURSING DIAGNOSIS	EXPECTED OUTCOMES	NURSING INTERVENTIONS
Deficient fluid volume related to nausea and vomiting	Patient will cease vomiting within 24 hr. Patient will establish fluid balance within 48 hr as evidenced by moist mucous membranes and good skin turgor.	Administer antiemetics as ordered. Monitor IV infusion site and fluid rate. Encourage clear oral fluids if ordered and tolerated. Monitor electrolyte levels for imbalances. Monitor I&O Provide mouth care q 2 hr while awake.
Imbalanced nutrition: less than body requirements related to nausea, vomiting, and improper diet	Patient will ingest a 1200-calorie diet per day within 7 days after subsidence of acute vomiting. Patient will maintain present weight.	Keep door of room closed to keep odors out. Offer mouth care before meal time. Provide 6 small meals a day plus small, high-calorie snacks between meals. Weigh q 3 days and record. Keep hard candy at bedside for snacking.
Impaired comfort related to jaundice and bile pigments in skin causing itching	Patient will verbalize that itching is decreased.	Assist to bathe with tepid water three times a day. Apply lotion q 2 hr. Provide diversional activities. Teach relaxation techniques.
Deficient knowledge related to ways in which HBV is transmitted, impact of hepatitis on the body, self-care measures, and measures to prevent transmission to others	Patient will verbalize ways HBV is transmitted, impact on body, self-care measures, and measures to prevent transmission to others before discharge.	Teach ways in which HBV is transmitted: parenteral routes, sexual contact, contact with blood and body fluids. Give explanation in understandable terms of what HBV does to the body. Reinforce teaching regarding self-care measures: hygiene, diet, rest, follow-up. Teach importance of not sharing personal articles (especially razor, toothbrush, etc.) with others. Instruct to inform health care workers of the presence of the virus until tests for it are negative. Inform that sexual partner(s) will need injection of special immune globulin for protection and then immunization.
Body image disturbance related to yellow skin color from jaundice	Patient will demonstrate acceptance of present body image by allowing visitors within 3 days.	Assure that jaundice is not permanent. Allow to ventilate feelings about the illness and present appearance. Encourage verbalization of positive aspects about self. Increase fluid intake to help flush bilirubin from blood during recovery.
Fatigue related to vague flulike symptoms	Patient will verbalize less fatigue before discharge.	Assess current level of energy. Assist with ADLs as needed. Suggest that visitors come when energy level is higher. Cluster care and allow for periods of rest. Help identify activities that require more energy and help patient prioritize accordingly.

HBV, hepatitis B virus; *I&O*, intake and output; *IV*, intravenous.

Complementary and Alternative Therapies

Vitamin E and Nonalcoholic Steatohepatitis

Nonalcoholic steatohepatitis (NASH) is a chronic liver disease that resembles alcoholic liver disease and can result in cirrhosis, liver cancer, or death. In a recent study, patients with NASH were given pioglitazone (Actos), which is a diabetic drug, and vitamin E. Although Actos caused undesirable weight gain, there was improvement in liver inflammation and liver enzymes. Patients taking high doses of vitamin E should be monitored by a physician and may need a biopsy to assess response to treatment (NIH News Release, 2010).

Complications

A small percentage of patients with hepatitis can develop massive necrosis of liver cells that results in acute liver failure. *Acute liver failure* is the preferred term according to the American Association for the Study of Liver Diseases. *Fulminant hepatitis* or *necrosis* and *fulminant hepatic failure* are older terms. The only hope for recovery is a liver transplant; without transplant, death occurs in about 75% of these cases. Symptoms of liver diseases include mental confusion, disorientation, and drowsiness, which indicate hepatic encephalopathy. **Ascites** (abnormal accumulation of serous fluid within the peritoneal cavity) and edema accompany liver failure.

CIRRHOSIS

Etiology

There were 27,555 deaths attributed to chronic liver disease and cirrhosis in 2006 (CDC, 2010). Excessive alcohol ingestion is the leading cause of the cases of cirrhosis in the United States and hepatitis B or C is the second cause (Allegretti, 2009). *Postnecrotic cirrhosis* is caused by viral hepatitis, toxic substances, parasites, or infection. There are three other types of cirrhosis. *Laënnec's cirrhosis,* or *portal cirrhosis,* results from alcoholism. The first change caused by excessive alcohol ingestion is the deposition of fat in the liver cells. This is reversible if alcohol consumption is halted; otherwise, widespread scar formation occurs. *Biliary cirrhosis* is from chronic biliary obstruction and infection. *Cardiac cirrhosis* results from long-standing, severe right-sided heart failure in patients with cor pulmonale.

Cultural Considerations

Liver-Related Deaths

Death related to liver disease is not among the top 10 causes of death for the general population; however for the American Indian and Alaska Native population, chronic liver disease and cirrhosis rank fifth as a cause of death, and for the Hispanic population liver disease is the sixth leading cause of death (Heron, 2010).

Pathophysiology

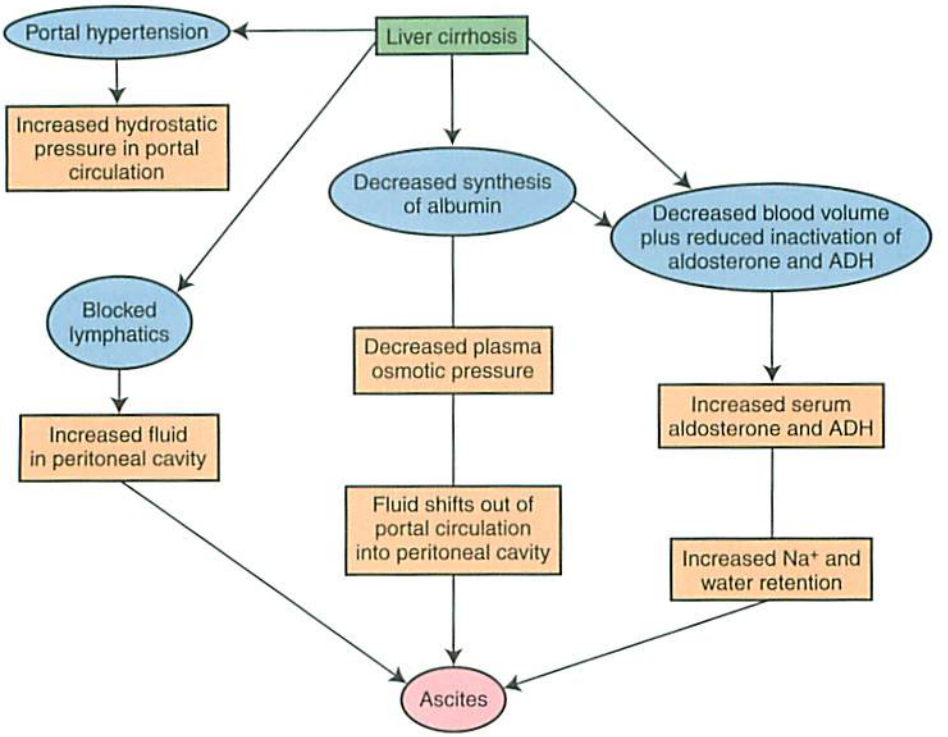
Cirrhosis is a progressive, chronic disease of the liver. Normal hepatic structures are destroyed and replaced with necrotic tissue. Fibrous bands of connective tissue develop in the organ, which eventually constrict and partition the liver tissue into irregular nodules. If this process is halted before too much liver tissue is damaged, the liver tissue will regenerate. Late cirrhosis is considered irreversible.

When liver cells begin to degenerate, the blood vessels within the liver also fail to function. This causes an obstruction to the flow of blood through the portal circulatory system, causing portal systemic hypertension. There is altered vessel permeability and fluid leakage into the abdomen, resulting in ascites. As pressure increases in the hepatic veins, there is a shift of protein-rich plasma filtrate into the lymphatic ducts. If the pressure is high enough in the ducts, the excess fluid will ooze from the surface of the liver into the peritoneal cavity. The fluid has a high colloidal pressure because of its high protein content and is not readily reabsorbed. Fluid accumulates in the cavity, causing increased abdominal girth and weight gain. Secondarily, the damaged liver's inability to synthesize albumin and the osmotic pressure within the blood vessels falls, allowing fluid to be pulled out into the tissues. The third mechanism contributing to ascites and edema is excess circulating aldosterone, which is not properly metabolized by the damaged liver. The excess aldosterone causes sodium and water retention (Concept Map 31-1).

Signs and Symptoms

Cirrhosis usually progresses without symptoms until severe liver damage is present. Subjective symptoms of liver cirrhosis include fatigue, weakness, headache, anorexia, indigestion, abdominal pain, nausea, and vomiting. Fluid retention in the right hemithorax or ascites can limit expansion of the chest and cause dyspnea. Objective symptoms of liver cirrhosis include excessive gas, skin rashes, and fever. Leg and foot edema and **palmar erythema** (redness of the palms that blanches with pressure) occur. Sometimes bluish varicose veins, called **caput medusa,** radiating from the umbilicus (indicating portal hypertension) are seen. Bleeding and bruising because of deficiencies in vitamin K, thrombin, or prothrombin interfere with clot formation. The liver often is enlarged and "knobby" and is palpable below the level of the right rib cage. Abdominal distention is present. The spleen also enlarges. Skin lesions, jaundice, **pruritus,** bleeding disorders, endocrine disorders, and peripheral neuropathy occur in late disease. **Spider angiomas** may appear on the face, neck, upper trunk, and arms.

Urine may become dark and foamy, and stools turn clay colored, which indicates that bile is not reaching the intestine. Jaundice occurs either because the liver cannot metabolize bilirubin or because bile flow is



CONCEPT MAP 31-1 Relationship of systemic portal hypertension and ascites in liver cirrhosis.

obstructed. Excessively high levels of bile pigment *(bilirubin)* are present in the blood. The pigment is deposited in the skin, mucous membranes, and body fluids, causing a change in color ranging from pale yellow to golden orange. The first signs of jaundice are usually seen in the sclera of the eye **(icterus),** which takes on a yellow tint. Jaundice is not always a sign of liver damage. In *hemolytic jaundice,* there may be an increased level of bilirubin as a result of excessive destruction of red blood cells, with resultant release of the pigment into the bloodstream. Figure 31-3 shows the all the signs and symptoms of cirrhosis. **Elevations in liver enzymes usually do not occur until 65% of liver function is gone.** The patient is likely to delay seeking medical attention until symptoms are pronounced.

Think Critically

Can you list the ways in which you would collect data when checking a patient for signs of jaundice?

Clinical Cues

In people with dark skin, jaundice is best detected by checking the buccal mucosa, hard palate, palms, soles of the feet, sclera, and conjunctiva.

Diagnosis

A definitive diagnosis of cirrhosis of the liver is made by liver biopsy. Laboratory testing may show a low albumin level and elevated prothrombin time, as well as elevated AST, ALT, ammonia level, and lactate dehydrogenase values. CT and liver scan can help determine the size of the liver and presence of any masses, and outline the hepatic blood flow and any obstruction to it. Magnetic resonance cholangiopancreatography—similar to ERCP but without the use of contrast media—may be performed.

Treatment

Treatment is aimed at stopping the liver damage, restoring the liver's functions and management of symptoms. **Medical treatment of ascites includes restriction of fluid and sodium intake and administration of diuretics.** Abdominal **paracentesis** can be performed to remove accumulated fluid; however, this a temporary measure that poses problems of rapid fluid shift, loss of protein, and the potential for introducing infectious organisms into the peritoneum. In years past, peritoneal-venous shunt (LeVeen or Denver shunt) involving the shunting of ascitic fluid into the venous system was used. Currently, a transjugular intrahepatic portosystemic shunt (TIPS) may be used to decrease pressure between portal and hepatic veins in the liver and decompress the varices. A catheter is inserted into the jugular vein and threaded through the superior and inferior venae cavae to the hepatic vein and then directed to the portal vein. Stents are placed that extend into both veins.

Safety Alert

Liver Inflammation

Patients with liver inflammation or cirrhosis should avoid taking large doses of vitamins and minerals. Vitamin A, iron, and copper can worsen the liver damage.

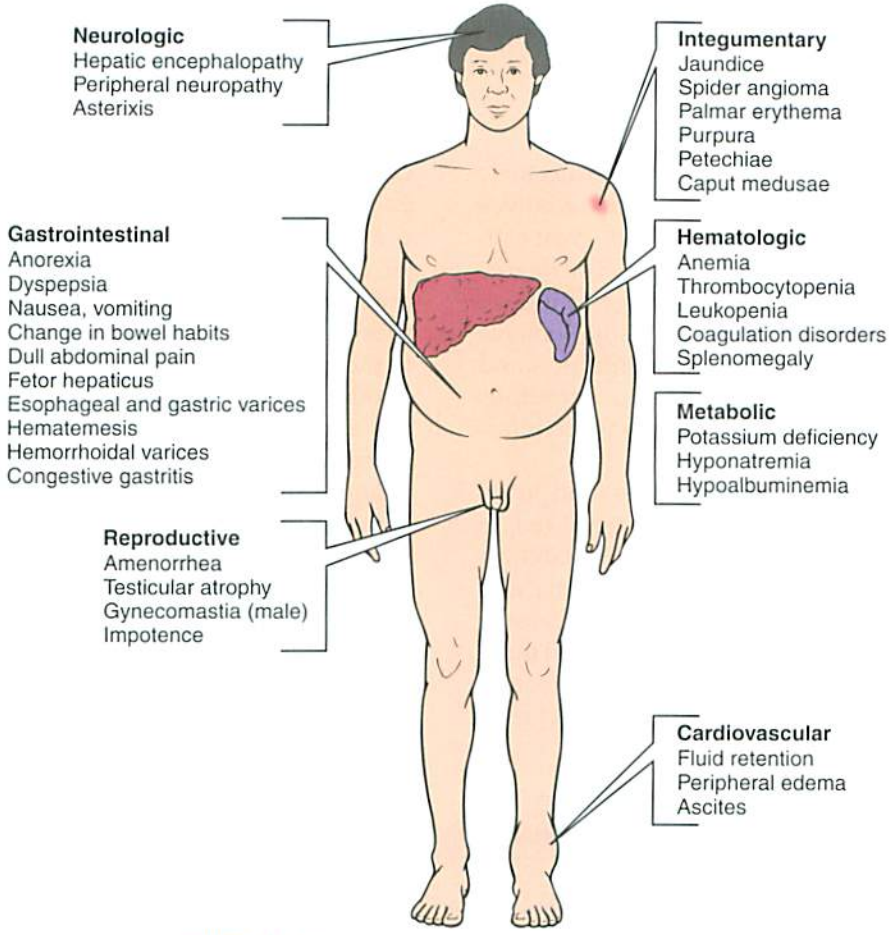


FIGURE 31-3 The many signs and symptoms of cirrhosis.

Traditionally, limitation of dietary protein intake was prescribed; however, this approach is being challenged and the current recommendation is to manage encephalopathy with medications rather than to restrict protein. Vegetable proteins are preferred because they do not contribute to encephalopathy (Mehta & Rothstein, 2009).

Thiamine and multiple vitamins are given to counteract vitamin deficiency. Neomycin is occasionally given orally or by enema to decrease the colonic bacteria that break down protein. This treatment lowers the formation of ammonia. The bowel is cleansed by enemas to decrease ammonia production further. Lactulose, an exchange resin, is given orally or by a feeding tube to induce diarrhea and prevent diffusion of ammonia out of the intestinal tract. Kidney failure sometimes accompanies liver failure (hepatorenal syndrome).

Cholesterol-binding medications such as cholestyramine (Questran), colestipol (Colestid), and colesevelam (Welchol) may be given to relieve pruritus from bile pigment deposits in the skin.

A relatively new therapy, albumin dialysis has been used to "bridge" the patient who is waiting for a liver transplant or to support function while acute failure is resolving. Theoretically, the albumin binds the toxins, cleanses the blood, and stops the inflammatory process. The therapy has improved level of consciousness related to encephalopathy and reduced mortality rates for chronic liver failure patients who experience an acute episode. It is an expensive therapy that requires specialized equipment and extensive training. Additional research is needed to identify adverse effects and to compare different systems (McCready, 2009).

❖ NURSING MANAGEMENT

▪ Assessment (Data Collection)

A thorough assessment to identify specific patient care problems related to abnormal liver function is performed (see Focused Assessment on p. 698). Assess for safety issues related to change in mental status. The patient may have bleeding signs. Pay extra attention to ammonia levels, albumin, AST, ALT, and prothrombin time (PT) results. Increase in ascites is determined by measuring and recording abdominal girth each day. Daily weights should also be initiated if fluid retention is observed. If alcoholism is an issue for your patient, be vigilant for signs of withdrawal, which may occur 6 to 12 hours after the last drink

and can continue for 3 to 5 days (see Chapter 47 for additional information).

▪ Nursing Diagnosis, Planning, Implementation, and Evaluation

The intake of alcohol and administration of drugs toxic to the liver must be completely restricted. Sedatives and opiates are either avoided or given with great caution. Rest may be prescribed to aid healing. The degree of rest and activity is dictated by the stage of illness. Nutritional deficiencies are treated with supplements and diet. The patient is at great risk for infection and should be protected from exposure to infectious agents; antibiotics should be given quickly when infection occurs.

Nursing diagnoses, expected outcomes, and interventions for the patient with cirrhosis are listed in Nursing Care Plan 31-1 (see also Table 31-5). Stabilization of fluid balance, normalization of vital signs, and progress toward baseline mental status and increasing ability to perform activities of daily living (ADLs) independently are indicators that the expected outcomes are being met; if not, new interventions are chosen for the plan.

? Think Critically

Can you identify signs and symptoms that you might find when assessing a patient with advanced cirrhosis of the liver?

Complications

Esophageal Varices. Bleeding from **esophageal varices** (dilated, distorted, engorged blood veins) is a major complication of cirrhosis. They are the result of portal congestion and hypertension. In advanced cirrhosis, blood that normally flows from the intestines to the portal vein and on through the liver is shunted to other veins, including the veins of the upper stomach and lower esophagus. The added load of blood causes congestion of these veins. When the vein walls rupture, massive bleeding occurs. Another factor in hemorrhage is that the liver is no longer able to make vitamin K, which is an essential component of clotting factors. Varices may rupture and produce **hematemesis** (vomiting of bright red blood) from increased blood pressure, coughing, vomiting, or mechanical irritation from poorly chewed food. For cirrhosis patients with bleeding esophageal varices, 30% to 60% die within 6 weeks of the first bleed.

Nursing Care Plan 31-1 Care of the Patient with Cirrhosis of the Liver

Scenario

A 62-year-old man with a 25-year history of alcoholism is admitted with progressive alcoholic cirrhosis. His complaints include thirst, extreme fatigue, a swollen abdomen, edema of the feet and ankles, jaundice, itching, nausea and indigestion, drowsiness, and slight confusion. Esophageal varices are present. All his liver function test results as well as his ammonia level show elevation, and his PT and INR are prolonged. His hematocrit, hemoglobin, and serum albumin levels are low.

Problem/Nursing Diagnosis

Actual (or potential for) difficulty breathing/Impaired gas exchange related to fluid accumulation in the chest (hydrothorax) or abdomen (ascites).

Supporting Assessment Data

Subjective: "I feel like I can't get my breath."
Objective: Shallow rapid breathing, RR 28-32/min; pauses to catch breath after slight exertion of moving in bed.

Goals/Expected Outcomes	Nursing Interventions	Selected Rationale	Evaluation
Patient will maintain adequate oxygenation as evidenced by respiratory rate of 12-24/min and oxygen saturation of <90%.	Assess rate, rhythm, and quality of respirations and do pulse oximeter readings at baseline and after interventions.	Changes in respiratory pattern or pulse oximeter suggest worsening, stabilization, or improvement.	Breathing is shallow and rapid if lying in supine position. If assisted to a sitting position, experiences temporary subjective relief. Pulse oximeter 93% when coached to inhale deeply.
	Place in semi-Fowler's position and observe for relief.	Raising head of bed (HOB) usually alleviates dyspnea, but ascites or hydrothorax may restrict chest expansion.	Relief obtained with HOB at 30 degrees.
	Auscultate lung fields at the beginning of the shift and as required (PRN) for worsening.	Compare findings to your initial assessment to discover changes.	Diminished in the bases bilaterally, with fine crackles.

ADLs, activities of daily living; *BP*, blood pressure; *I&O*, intake and output; *INR*, international normalized ratio; *PT*, prothrombin time; *R*, respirations.

Goals/Expected Outcomes	Nursing Interventions	Selected Rationale	Evaluation
	Administer oxygen as ordered.	Oxygen is generally ordered if saturation falls below 90% (physician may set the parameter higher).	Currently, pulse oximeter shows 93% when awake; however, level drops to 90% when asleep.
	Encourage use of incentive spirometer and teach deep breathing and coughing.	Chest expansion may be limited; therefore patient must be encouraged to make an extra effort to prevent pneumonia and atelectasis.	Willing to try spirometer, but needs continuous reminding. Family members able to help by encouraging him.

Problem/Nursing Diagnosis

Potential for bleeding from esophageal varices/Risk for bleeding related to esophageal varices and decreased clotting factors.

Supporting Assessment Data

Subjective: "Thirsty."

Objective: Elevated liver function test results; cirrhosis, spider angiomas, jaundice, ascites, and prolonged PT.

Goals/Expected Outcomes	Nursing Interventions	Selected Rationale	Evaluation
Patient will not experience life-threatening hemorrhage while hospitalized.	Monitor stool and emesis for blood and other bleeding signs.	Alerts to bleeding.	No signs of bleeding.
	Feed only soft foods.	Prevents mechanical irritation of esophagus.	Eating soft foods; favors puddings and cooked cereals.
	Give vitamin K as ordered.	Vitamin K is needed for synthesis of clotting factors.	Vitamin K administered.
	Monitor vital signs q 2-4 hr as ordered.	Vital sign changes, restlessness, and confusion may indicate bleeding.	BP 120/80, pulse 87/min, R 24/min; is anxious.
	Observe for increasing restlessness and confusion that might indicate hypoxia secondary to bleeding.		Alert and oriented to person and place.
	Monitor PT and INR.	Prolonged clotting times contributes to rapid blood loss.	Laboratory test results pending. Continue plan.

Problem/Nursing Diagnosis

Confusion and drowsiness/Acute confusion related to increased ammonia level caused by liver failure.

Supporting Assessment Data

Subjective: Confused as to month.

Objective: Elevated serum ammonia and drowsiness.

Goals/Expected Outcomes	Nursing Interventions	Selected Rationale	Evaluation
Serum ammonia levels will not increase further during hospitalization.	Neomycin enemas as ordered.	Neomycin kills intestinal bacteria that help digest protein and produce ammonia.	Administered neomycin enema.
Serum ammonia levels will return to normal within 2 mo.	Administer lactulose as ordered.	Lactulose decreases absorption of ammonia.	Lactulose administered; diarrhea occurring. A&D ointment applied to anal area after bowel movements.
	Monitor serum ammonia levels.	Assists in determining likelihood of coma.	Lab work to be drawn in A.M. Continue plan.

Continued

Nursing Care Plan 31-1 Care of the Patient with Cirrhosis of the Liver—cont'd

Problem/Nursing Diagnosis

Unfamiliar environment and confused/Risk for injury related to confusion, drowsiness, and weakness.

Supporting Assessment Data

Subjective: "This room looks strange. I can't find the toilet."
Objective: Elevated serum ammonia and slight confusion.

Goals/Expected Outcomes	Nursing Interventions	Selected Rationale	Evaluation
Patient will not experience injury while hospitalized.	Monitor mental status q 4 hr.	Determines worsening of disorientation.	Oriented to person and place, can recall month with repeated coaching.
	Call bell within reach, bed at lowest level.	Prevents injury from accidental fall from bed.	Bed down, call bell within reach.
	Offer frequent assistance with toileting and other needs (i.e., hygiene, fluids).	Decreases incidents of wandering or falls if trying to meet own needs.	Offered toileting and mouth care q 2-3 hr. No injury sustained. Continue plan.

Problem/Nursing Diagnosis

Cannot perform ADLs/Self-care deficit related to fatigue, drowsiness, and ascites.

Supporting Assessment Data

Subjective: "I'm so sleepy and weak."
Objective: Cannot perform ADLs; very drowsy, ascites present.

Goals/Expected Outcomes	Nursing Interventions	Selected Rationale	Evaluation
Patient will be able to assist with ADLs within 2 wk.	Bathe with tepid water and apply emollients to decrease itching every shift.	Keeps patient clean and dry, decreases itching.	Baths and emollients have decreased itching slightly.
Patient will be able to perform ADLs independently within 1 mo.	Offer mouth care q 2 hr.	Mouth care improves appetite.	Mouth care given q 2 hr.
	Assist with meal trays.	May lack fine motor coordination to open packages.	Set up meal tray.
	Assist with toileting.	Prevents falls and aids with elimination.	Assisted with toileting. Continue plan.

Problem/Nursing Diagnosis

Fluid retention/Fluid volume excess related to ascites and peripheral edema from portal hypertension.

Supporting Assessment Data

Objective: Ascites, edema of feet and ankles, 6-lb weight gain in 2 days.

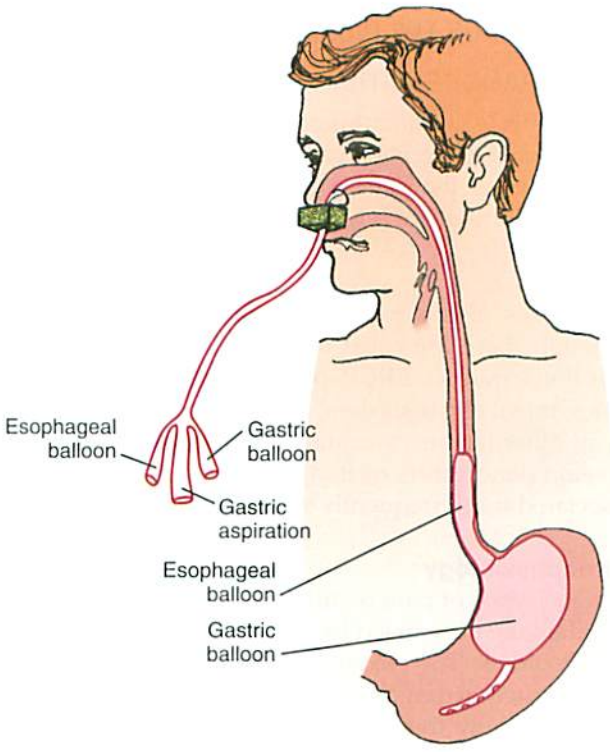
Goals/Expected Outcomes	Nursing Interventions	Selected Rationale	Evaluation
Patient will have no further increase in ascites this week.	Measure abdominal girth every shift.	Determines whether ascites is increasing or decreasing.	Abdominal girth down ⅛ inch.
Patient will return to normal fluid balance within 2 wk.	Administer diuretics as ordered and monitor I&O.	Diuretics remove excess fluid from the body. I&O tracks fluid removal.	Diuretic administered. Intake 400 mL; output 670 mL.
	Weigh daily and record.	Daily weight indicates whether diuretic therapy is effective.	Weight down 1.5 lb.
	Turn at least q 1-2 hr. Provide good skin care.	Turning and skin care prevent pressure sores.	Turned q 2 hr; skin care provided; no reddened or excoriated areas over pressure points. Continue plan.

Critical Thinking Questions

1. Can you describe the correct way to measure abdominal girth?
2. Why is good skin care even more important when a patient has edema and ascites?
3. How high would a PT or INR level have to climb before you would report it to the physician immediately?
4. Why would it be important to monitor this patient for symptoms of alcohol withdrawal?

Treatment options are to put pressure via balloon tamponade with a Blakemore-Sengstaken tube (Figure 31-4), administration of parenteral vasopressors such as vasopressin (Pitressin) to lower portal pressure, injection scleropathy or ligation of the bleeding vessels, embolization of the left gastric vein, or emergency portacaval shunt surgery. Other vasoconstrictors such as terlipressin (Glypressin), somatostatin (Zecnil), and octreotide (Sandostatin) are used to reduce portal blood flow. Nitroglycerin is given to reduce vascular resistance in the liver without interfering with peripheral circulation. A beta blocker may be given to lower blood pressure. The patient is given vitamin K by injection to help rectify clotting factor deficiencies. The treatment of hemorrhage of the upper GI tract is discussed in Chapter 29.

Encephalopathy. Portal systemic encephalopathy is another dangerous complication of cirrhosis. Encephalopathy in this instance is directly related to liver failure and is attributed to the buildup of ammonia and gamma-aminobutyric acid. Symptoms such as delirium, convulsions, **asterixis** (flapping tremors) and coma occur. Asterixis is observed by having the patient hold out the arms and hands and watching for rapid flexing and extension movements of the hands. There may be rhythmic movements of the legs with dorsiflexion of the foot and rhythmic movements in the face with strong eyelid closure. **Fetor hepaticus** (breath with a sweet, fecal odor) occurs as liver failure progresses.



If the bleeding site is in the esophagus, as from esophageal varices, the esophageal balloon is inflated. If the bleeding site is in the stomach, the gastric balloon is inflated. Inflation of the balloon creates pressure against bleeding vessels.

FIGURE 31-4 Blakemore-Sengstaken tube.

LIVER TRANSPLANTATION

Liver transplantation is considered for patients with progressive and advanced liver disease that does not respond to treatment. It is most commonly done for nonalcoholic cirrhosis, chronic active hepatitis, sclerosing cholangitis, metabolic disorders, and biliary atresia in children. Some recovered alcoholics with cirrhosis are candidates. From 70% to 80% of liver transplantation patients survive at least 3 years with good quality of life. Many transplant recipients develop cirrhosis by the fifth year. Organ transplantation, tissue matching, and measures to prevent organ rejection are discussed in Chapter 12. If the patient has encephalopathy preoperatively, an epidural sensor is placed to monitor intracranial pressure (ICP). Every attempt is made to keep ICP within normal limits, as increased ICP levels are correlated with decreased survival rates after transplantation.

Legal and Ethical Considerations

Liver Transplantation

Available cadaver organs are in short supply. There is controversy about how available organs that fit a patient's genotype should be allotted. Should a person closest to the geographic location of the suitable cadaver liver receive it? Should the person who has been on the transplant list the longest be the recipient? Should the person who is closest to death be given the liver? Should the person whose liver was destroyed by alcohol or from recreational drug use be in line before the person with a metabolic or viral disease that caused end-stage cirrhosis? Should the recipient's age be a factor in the decision? These are examples of questions that enter into the liver transplantation decision.

Nursing Management

After surgery a T-tube and Jackson-Pratt drains will be in place. The patient must take cyclosporine for life to prevent rejection of the new liver. Other immunosuppressants such as azathioprine (Imuran), corticosteroids, tacrolimus (Prograf), monoclonal antibody OKT3, and interleukin-2 receptor antagonists such as basiliximab (Simulect) and daclizumab (Zenapax) may also be added. Strict infection control and prevention is necessary and the patient is monitored closely for signs of hemorrhage or hypovolemia. Measures are instituted to prevent pneumonia, atelectasis, and pleural effusions. Liver functions, serum potassium, serum glucose, and coagulation factors are monitored closely. Right quadrant or flank pain, increasing jaundice, fever, and changes in stool and urine color may indicate organ rejection. Close medical supervision is necessary after discharge.

CANCER OF THE LIVER

Etiology

Primary cancer of the liver is rare in the United States, but is a common malignancy in Africa and Asia and is caused by a parasite called the liver fluke. Liver cancer may be triggered by aflatoxin, a mold that grows on spoiled peanuts, corn, and grains. Metastatic liver cancer is much more prevalent than primary liver cancer, but the end result is the same. Cirrhosis and hepatitis B or hepatitis C increase the risk. Three times as many men as women develop liver cancer.

Pathophysiology

There are two types of primary liver cancer: (1) hepatoma, which arises from the hepatocytes, and (2) cholangiocarcinoma, or bile duct cancer. Benign tumors also occur in the liver. Hepatoma usually develops in people who have cirrhosis. A rare disorder called *hemochromatosis*, which causes deposits of iron in the body, predisposes to the development of hepatoma. Cholangiocarcinoma's cause is unknown, but it occurs more frequently in people with inflammation of the bowel, such as ulcerative colitis.

Pathophysiologically, there is irritation and inflammation with disruption of the structure of normal liver cells. The cancer spreads throughout the organ and invades the portal vein and lymphatics. It may metastasize to the lungs, brain, kidneys, and spleen.

Signs, Symptoms, and Diagnosis

Symptoms may include right upper quadrant pain, fatigue, anorexia, weight loss, weakness, or fever plus signs of poor liver function. Pain may radiate to the back. Because symptoms often are vague, diagnosis of liver cancer occurs late and death may occur within 6 to 18 months.

Diagnostic tests are used to determine the presence of tumor and the stage of the cancer and to find areas of metastasis. Fine-needle biopsy or brush biopsy during ERCP gives a definitive diagnosis.

Treatment and Nursing Management

If no distant spread is found and there is no lymph node involvement, surgical resection may be attempted. If the tumor is primary and has not metastasized, liver transplantation is an option. Treatment is combined radiation and chemotherapy that is infused intravenously or directly into the hepatic circulation. Commonly used agents are 5-fluorouracil (5-FU), floxuridine (FUDR), doxorubicin, and methotrexate. Chemoembolization, wherein an oily substance called lipiodol is added to the drugs given intra-arterially, makes the chemotherapy more effective. The treatment may induce toxic hepatitis, which subsides after the end of therapy. A new drug, sorafenib (Nexavar), has improved the survival of patients with advanced cancer. Other drugs that inhibit tumor growth by interfering with the blood supply that feeds the tumor are being tested in combination with sorafenib and include bevacizumab (Avastin), erlotinib (Tarceva), and sunitinib (Sutent) (NCL Cancer Bulletin, 2007).

Tumor ablation is used for tumors less than 5 cm in diameter. Ethanol or acetic acid is injected through the skin into the tumor. The liquid destroys the cancer cells. The procedure is carried out in the radiology department with the use of ultrasound.

Laser or radiofrequency ablation that causes heat to destroy cancer cells is performed with a local anesthetic. This procedure is used for cholangiocarcinoma. Cryotherapy may be used during surgery; a probe deposits liquid nitrogen to the tumor site and destroys cancer cells.

Radioimmunotherapy is experimental and uses a radioactive isotope that attaches to a radiolabeled antibody against a protein found in liver tumors. It is given intravenously, concentrates in the liver, and irradiates the tumor internally. The side effects of thrombocytopenia and neutropenia occur 4 to 6 weeks after treatment.

Nursing care includes assessing for signs and symptoms of liver failure and blockage in the common bile duct. Additional care is directed at the associated problems, such as ascites and encephalopathy. Surgical care is provided as for other abdominal surgery patients (see Chapter 5). Care of the cancer patient undergoing chemotherapy and radiation is located in Chapter 8.

DISORDERS OF THE PANCREAS

ACUTE PANCREATITIS

Pancreatitis is an inflammation of the pancreas. It may be acute or chronic. Pancreatitis frequently accompanies obstruction of the pancreatic duct from gallstones or from the backflow of bile into the pancreatic duct.

Etiology

Most cases of pancreatitis are related to alcoholism, although there are cases due to biliary disease. Viral infections, trauma, ERCP, penetrating ulcers, drug toxicities, metabolic disorders, scorpion stings, and a variety of other factors can cause pancreatitis. Men tend to develop pancreatitis related to alcohol. In women, it is associated more frequently with gallstones.

Pathophysiology

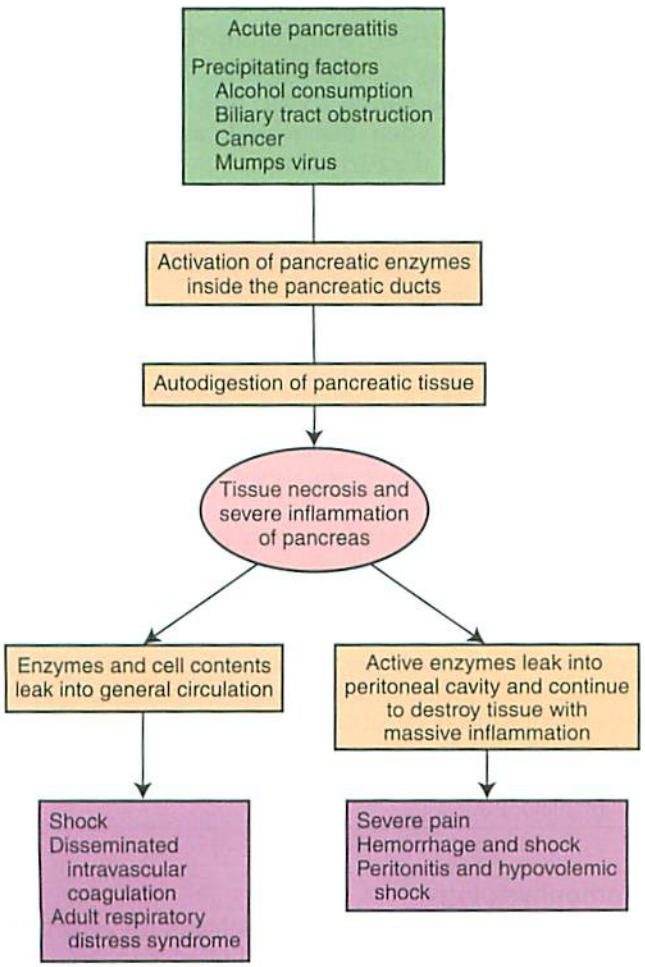
In some types of pancreatitis, the severe inflammation and damage are caused by escape of pancreatic digestive enzymes. The enzymes act directly on the tissue, causing hemorrhage, autodigestion, and necrosis. It is unclear how the autodigestion is activated. Reflux of bile and duodenal contents into the pancreatic duct is a possible mechanism. A gallstone stuck in the ampulla of Vater can cause edema of the sphincter of Oddi, which might permit reflux of duodenal contents. Alcohol can cause spasm of the sphincter of

Oddi, blocking secretion through the pancreatic ducts. This may lead to activation of the pancreatic enzymes within the pancreas.

Pancreatic abscess or pseudocysts may develop. An abscess may form from the purulent liquefaction of the necrotic pancreatic tissue. A **pseudocyst** is a sac-like structure that forms on or around the pancreas. It may contain several liters of enzymatic pancreatic exudates. If a pseudocyst ruptures, it may cause hemorrhage. Shock may occur, as well as other life-threatening complications (Concept Map 31-2).

Signs and Symptoms

Pancreatitis causes abdominal pain that is usually acute, but this can vary among individuals. The pain is steady and is localized to the epigastrium or left upper quadrant. As it progresses, it spreads and radiates to the back and flank. Sitting and leaning forward may ease the pain. The severity of the pain may slowly decrease after 24 hours. **Eating makes the pain worse.** Nausea, vomiting, sweating, jaundice, and weakness often accompany pain.



CONCEPT MAP 31-2 Pathophysiology of acute pancreatitis.

Clinical Cues

The patient with acute pancreatitis may curl up in a tight fetal position (knee-chest) because this opens up the retroperitoneal space and decreases pain. Assuming a supine position for a procedure or assessment, is likely to increase the pain; therefore acknowledge the patient's discomfort and help him to resume the position of greatest comfort when the procedure is over.

Examination of the abdomen will reveal tenderness and guarding. If peritonitis is present, there will be distention and rigidity. Bowel sounds may be reduced or absent. A pseudocyst can be palpated as an epigastric mass in about 50% of cases. If retroperitoneal bleeding is present, there may be bruising in the flanks or a bluish discoloration around the umbilicus. There may be signs and symptoms of respiratory distress (secondary to atelectasis, pleural effusion, or respiratory distress syndrome) such as shock, tachycardia, leukocytosis, and fever. Serum amylase may be two times normal and will remain elevated for 72 hours. Serum lipase remains elevated for several days. If biliary obstruction is involved, mild jaundice may be present. Laboratory values will indicate hypoglycemia, hypocalcemia, and hypokalemia.

Diagnosis

Diagnosis is based on the symptoms, risk factors, and results of tests performed to rule out other disorders. An abdominal sonogram, CT scan, and serum and urine amylase studies are usually ordered.

Treatment and Nursing Management

Vital signs are taken frequently, urinary output is monitored, and the patient is monitored for signs of shock. Observe for signs of restlessness, use of accessory muscles for breathing, irritability, confusion, or dyspnea, which indicate respiratory distress, and administer oxygen as ordered. Pain evaluation and control are primary nursing responsibilities. Monitor laboratory values and note changes. Monitor administration of fluids and observe for electrolyte imbalances. The patient is allowed nothing by mouth during the acute phase to prevent stimulation of the pancreas and further aggravation of the inflammation. Nasogastric intubation with suction may be employed to empty the stomach and duodenum. IV fluids are given until the edema of the pancreas and the pancreatic duct has subsided. If the patient is receiving total parenteral nutrition (TPN), blood glucose needs to be checked regularly, and insulin may be necessary. Most patients with acute pancreatitis recover after receiving this type of treatment.

Assess for tolerance of the diet as the patient slowly resumes bland, soft foods. Pancreatic enzymes are given supplementally when an oral diet is resumed. If abscess or pseudocyst are present, they will be surgically

drained. Intravenous meperidine or morphine via PCA pump may be needed to control pain. Histamine (H_2)-receptor antagonists or a proton pump inhibitor may be given to decrease the hydrochloric acid secretion that stimulates pancreatic activity. Administration of antispasmodics such as dicyclomine (Bentyl) or propantheline bromide (Pro-Banthine) is helpful.

Clinical Cues

When a powdered form of pancreatic enzymes must be taken, it should be mixed in nonprotein food, such as applesauce. Care must be taken not to let any of the medication remain on the lips or skin as it will cause irritation.

Think Critically

Your patient with acute pancreatitis has a nasogastric tube in place. The patient says, "I want this tube taken out, and I want to eat." What will you say to the patient?

CHRONIC PANCREATITIS

Etiology and Pathophysiology

Chronic pancreatitis is most frequently seen in men who have been drinking alcohol for many years. Repeated bouts of inflammation cause progressive fibrosis of the gland, stricture of the ducts, and eventual calcification.

Signs and Symptoms

Abdominal pain is the major symptom. There may be periods of acute pain, but chronic pain at intervals of months or years is more common. Other symptoms are related to pancreatic insufficiency as less and less pancreatic tissue is functional. Malabsorption with weight loss and steatorrhea, constipation, mild jaundice with dark urine, and diabetes mellitus develop.

Diagnosis

Determination of bicarbonate concentration and output in the duodenum after stimulation with secretin is the definitive test for chronic pancreatitis. Other helpful diagnostic tests are fecal fat determination, fasting blood glucose, arteriography, and radiographic examinations of the pancreas. Pancreatic cancer or another liver disorder can produce the same results on these tests. The differential diagnosis is difficult. Serum amylase and lipase may be elevated slightly or not at all. There may be increases in serum bilirubin and alkaline phosphatase. Leukocytosis and an elevated sedimentation rate are present.

Treatment and Nursing Management

Treatment during an acute episode of chronic pancreatitis is the same as for acute pancreatitis.

After the acute attack has resolved, rest is essential even if the patient does not feel ill. Help your patient by reinforcing information about the disease process and the therapeutic regimen, which will include prescribed pancreatic enzymes to be taken with low-fat meals. Long-term pain control presents problems. The patient is switched to non-narcotic pain medications to try to prevent addiction, but these are often insufficient for pain control. Complications such as diabetes mellitus must be addressed and diet requirements and medications should be reviewed with the patient. Chronic pancreatitis interferes with the patient's usual lifestyle and often is accompanied by depression, so your patient should be periodically assessed for signs of depression and appropriate referrals should be made. **A major nursing action is to be supportive of efforts to abstain from alcohol.** Table 31-6 presents nursing diagnoses and specific interventions appropriate for patients with pancreatitis.

CANCER OF THE PANCREAS

Etiology

The cause of pancreatic cancer is unknown. There were approximately 42,470 new cases of cancer of the pancreas and 35,240 deaths in the United States in 2009. It is more common in men than in women and occurs more often in the over-55 age group. Diets high in red meats and fats may increase the risk. Cancer of the pancreas is often fatal within 1 year. It is usually in a very advanced state when discovered, as the patient is asymptomatic in the early stages.

Cultural Considerations

Pancreatic Cancer Deaths

More African American men die from pancreatic cancer than do men from any other ethnic group (American Cancer Society, 2010). Alcohol use and abuse is a major factor. Working with community leaders to discourage the immoderate use of alcohol might decrease the problem.

Complementary and Alternative Therapies

Healthy Gums for Better Pancreatic Health

In a longitudinal study, men had a 64% greater risk for developing pancreatic cancer if they had gum inflammation and tooth loss. Gum inflammation has been linked to coronary artery disease and the theory is that gum disease leads to inflammation throughout the body. Patients should be encouraged to take care of their teeth as a step toward an overall healthier lifestyle (Lichtenfeld, 2007).

Pathophysiology

Cigarette smoking is the major risk factor for pancreatic cancer; 2 to 3 of every 10 cases are linked to tobacco use. Adenocarcinoma arising from the epithelial cells in the

Table 31-6 Common Nursing Diagnoses, Expected Outcomes, and Nursing Interventions for Patients with Disorders of the Pancreas

NURSING DIAGNOSIS	EXPECTED OUTCOMES	NURSING INTERVENTIONS
Acute pain related to pancreatic inflammation	Patient's pain level will decrease per pain scale within 1 hr of instituting nursing measures. Patient will state that pain is controlled within 8 hr.	Medicate with analgesic as ordered. Instruct in use of PCA pump if ordered. Encourage relaxation techniques to decrease discomfort. Assess q 2 hr for adequate pain relief. Administer adjunctive medications as ordered. Assist into knee-chest position for comfort. Maintain NPO status and NG tube for decompression as ordered and explain how these two therapies decrease the pain.
Risk for ineffective breathing pattern related to irritation or pressure to diaphragm from ascites or pancreatic abscess/ pseudocyst	Patient will maintain adequate oxygen levels as evidenced by oxygen saturation within normal limits.	Observe for signs of respiratory distress. Auscultate lungs for crackles or abnormal lung sounds. Monitor oxygen saturation with pulse oximeter. Administer supplemental oxygen as ordered. Encourage use of incentive spirometer as ordered. Place in semi-Fowler's position as tolerated to promote better lung expansion.
Risk for bleeding related to potential autodigestion or rupture of abscess resulting in circulatory collapse	Patient will not experience shock symptoms while hospitalized.	Monitor laboratory values for liver enzymes, ammonia, albumin, sodium, potassium, calcium, and magnesium daily. Observe for subtle changes in mental status. Monitor vital signs closely. Observe stool for signs of bleeding. Monitor urine output. Report frank bleeding promptly.
Deficient knowledge related to pancreatitis and its treatment and prevention of recurrence	Patient will verbalize understanding of disease process within 2 wk. Patient will verbalize understanding of treatment regimen within 1 wk. Patient will verbalize ways to prevent recurrence of pancreatitis before discharge.	Instruct in patient-specific causes (i.e., alcohol, ulcer, gallstones) and disease process (i.e., eating triggers digestive enzymes which act directly on the tissues). Explain all aspects of treatment (e.g., NPO and NG decompression decrease the release of enzymes therefore pain is decreased) and reason for each medication (e.g., dicyclomine decreases GI tract spasms). Teach ways to prevent recurrence of pancreatitis (i.e., abstain from alcohol).
Fear related to possibility of disability or death	Patient will verbalize that fear has decreased before discharge.	Establish trusting relationship by attentive, caring attitude. Encourage verbalization of fears; actively listen. Encourage contact with minister, hospital chaplain, or spiritual advisor. Point out any encouraging signs of improvement.

GI, gastrointestinal; *NG*, nasogastric; *NPO*, nothing by mouth; *PCA*, patient-controlled analgesia.

ducts is the most common form of pancreatic neoplasm. Tumor in the head of the pancreas obstructs biliary and pancreatic flow. Cancer in the body and tail of the pancreas usually remains asymptomatic until it is well advanced and invades the liver, stomach, lymph nodes, or posterior abdominal wall and nerves. Metastasis occurs early. Biliary obstruction usually causes liver failure.

Health Promotion

Smoking Cessation

Most people are aware of the relationship between smoking and lung cancer; however, it is also necessary to tactfully point out the effects on other vital organs, such as the pancreas. Provide referral to community resources for smoking cessation and written materials with options on how to quit.

Signs and Symptoms

Epigastric pain and weight loss are the main symptoms of pancreatic cancer. Anorexia and vomiting may occur, and the patient may develop a dislike for red meat. When the disease is advanced, jaundice appears along with dark urine and clay-colored stools. There is glucose intolerance. There is a high incidence of clot formation with pancreatic cancer.

Safety Alert

Deep Vein Thrombosis

Because of the increased risk of clot formation in patients with pancreatic cancer, it is important to assess for signs and symptoms of deep vein thrombosis (DVT): pain, heat, or swelling in the calves. One leg may be swollen; measure the calf and ankle and compare to the other leg. Check for signs of pulmonary embolus as well: restlessness, apprehension, chest pain, and shortness of breath. Should these signs and symptoms occur, report them to the physician immediately. Joint Commission National Quality Core Measures require rigorous prevention of DVT for all patients.

Diagnosis

Diagnosis is made by ultrasonography, imaging techniques, and fine-needle biopsy. Elevated carcinoembryonic antigen levels occur 80% to 90% of the time when pancreatic cancer is present. However, serum beta-human chorionic gonadotropin and carbohydrate antigen (CA) 72-4 are the strongest indicators of pancreatic cancer. The tumor markers CA 19-9 and CA 242 are used to monitor for potential spread or recurrence.

Treatment

High doses of opioid analgesics are usually required to keep the patient comfortable. Drug dependency should not be a concern. Treating or preventing malnutrition is a major goal. Enteral feedings may need to be given into the jejunum *(jejunostomy)*. TPN may be needed to provide adequate nutrition (see Chapters 3 and 29).

Surgical treatment is appropriate for resectable tumor in about 15% to 20% of patients but has not been highly successful in curing the disease. It provides a 5-year survival rate of less than 5%. Surgery is used mainly to relieve symptoms of obstructive jaundice, severe pain, or other complications. A Whipple procedure, or radical pancreaticoduodenectomy, may be done for cancer of the head of the pancreas. The head of the pancreas, the gallbladder, the duodenum, part of the jejunum, and all or part of the stomach are removed. The spleen may also be removed. The remaining structures are anastomosed to the jejunum. Another option is total pancreatectomy. The patient will usually go to the surgical critical care unit after surgery. Nursing care is the same as for any abdominal surgery, but there are many complications that can occur; vigilance is essential. The patient will need enteral feedings, perhaps for life. A stent may be placed in the pancreatic duct to promote exit of pancreatic secretions and enzymes.

Other treatments include radiofrequency ablation and microwave therapy, which use heat to destroy tissue, and cryosurgery, which uses cold. Embolization therapy can be used to cut off the blood supply to the tumor. Cyberknife treatment—an image-guided radiosurgery that helps target pancreatic tumor without disrupting other tissue—is an option. Intensive external beam radiation therapy may offer pain relief, alleviate duct obstruction, and improve food absorption. Radioactive iodine (^{125}I) seeds may be implanted in combination with systemic or intra-arterial administration of floxuridine.

Gemcitabine (Gemzar) and 5-FU are common for treatment of nonresectable or metastatic tumors (American Cancer Society, 2010). Outcomes for advanced cases are better when erlotinib is added. A combination of drugs has proven most effective, and other commonly used drugs include irinotecan (Camptosar), docetaxel (Taxotere), capecitabine (Xeloda), oxaliplatin (Eloxatin), and cisplatin (Platinol). Other drugs that may be used include the targeted-therapy drug sunitinib, which blocks the growth signal. Octreotide or lanreotide suppresses the hormone release from the tumor. Pasireotide is a new drug that is currently under study. In animal studies, a TAK-1 inhibitor pill or tigatuzumab was combined with gemcitabine, and the outcomes showed promise in the future treatment of advanced pancreatic cancer (Laino, 2009; Science Daily, 2009).

Nursing Management

Nursing care is geared toward managing the severe pain and managing the side effects of treatment. Postoperatively, observe for hyperglycemia, hemorrhage, bowel obstruction or paralytic ileus, wound infection,

and intra-abdominal abscess. Monitor the NG tube for clear, colorless, bile-tinged drainage or frank blood with an increase in output, as this may indicate leakage at an anastomosis site. Provide care for the postoperative patient with abdominal surgery (see Chapter 5). Chapter 8 contains information on care of the cancer patient undergoing chemotherapy or radiation.

COMMUNITY CARE

Nurses in the community should promote immunization against hepatitis B virus in all persons at risk. Teenagers and adults should be counseled about the possibility of transmission of hepatitis B virus by sexual contact and advised of measures for protection. The hepatitis A vaccine should be recommended for those traveling in areas where this disorder is prevalent and for those at risk of liver problems. Nurses should be aware of policies and procedures for reporting new cases of hepatitis to local health departments. All health care workers should be tested for the presence of hepatitis C virus.

Nurses in extended care facilities should be alert to signs of jaundice in patients. Dark-colored urine is frequently an early sign of a problem. Cancer and gallstones are both more prevalent in the elderly, and when abdominal pain occurs these disorders must be considered. Home care nurses must be particularly alert to the possibility of liver or pancreatic problems due to medications the patient is taking. Encourage regular laboratory work as recommended when the patient is taking a drug known to be potentially damaging to the liver.

Get Ready for the NCLEX® Examination!

Key Points

- Factors that are associated with cholelithiasis and cholecystitis include hemolytic disease, surgical treatment of Crohn's, rapid-weight-loss diets or starvation, multiple pregnancies or hormonal replacement therapy, major trauma, burns, and cardiac surgery.
- Signs and symptoms of acute cholecystitis include acute pain, fever, anorexia, nausea and vomiting, dehydration, and mild jaundice.
- Typical symptoms of chronic cholecystitis are indigestion, flatulence, nausea after eating fatty foods, and intermittent pain referred to the back.
- There are five main types of hepatitis: A, B, C, D, and E (see Table 31-2). Hepatitis is treated by rest, a nutritious low-fat diet, and avoidance of substances that are harmful to the liver (see Box 28-1).
- Signs and symptoms of liver disorders are fatigue, weakness, anorexia, abdominal pain, nausea and vomiting, skin rashes, itching, fever, dark urine, light-colored stools, peripheral edema, bruising, and jaundice.
- Chronic inflammation causes fibrosis and cirrhosis of the liver cells. Diagnosis of cirrhosis includes liver biopsy, liver function tests, prothrombin time, and albumin levels.
- Bleeding esophageal varices and hepatic encephalopathy are complications of cirrhosis.
- Chemotherapy, radiation, and ablation therapies are used for treatment of liver cancer.
- In acute pancreatitis, inflammation and damage are caused by escape of pancreatic digestive enzymes, causing hemorrhage, autodigestion, and necrosis. Symptoms include acute, steady pain in the epigastrium or left upper quadrant. Serum lipase and amylase are elevated. Treatment consists of pain control, reduction of pancreatic secretions, restoration of fluid and electrolyte balance, and treatment for complications such as shock or diabetes.
- Chronic pancreatitis is related to alcoholism. Long-term pain control is an issue.
- Signs and symptoms of pancreatic cancer are weight loss, anorexia, vomiting, and signs of pancreatic dysfunction. Not smoking cuts the incidence of pancreatic cancer by 50%.
- Treatment of pancreatic cancer includes pain management, and chemotherapy and radiation, which may improve food absorption, relieve pain, and alleviate duct obstruction.

Additional Learning Resources

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evolve Go to your Evolve website (http://evolve.elsevier.com/deWit/medsurg) for the following FREE learning resources:

- Animations, audio, and video
- Answers and rationales for questions and activities
- Concept Map Creator
- Glossary with pronunciations in English and Spanish
- Interactive Review Questions and Exercises and more!

Online Resources

- Recommended Adult Immunization Schedule, www.cdc.gov/mmwr/PDF/wk/mm5901-Immunization.pdf

Review Questions for the NCLEX® Examination

1. Before being discharged to home, the patient with gallbladder disease is given instructions regarding the care of the drain and the T-tube. Which patient statement indicates a need for further teaching?
   1. "I must empty the bag the same time each day."
   2. "Loose-fitting clothes must be worn."
   3. "I would have yellowish skin discoloration the rest of my life."
   4. "Passing brown stools indicates return to normal function."

2. If the patient has a history of chronic cholecystitis, which comment is cause for greatest concern?
   1. "I have back pain at the level of the shoulder blade."
   2. "I had nausea after eating a hamburger and fries."
   3. "I have generalized abdominal pain and fever."
   4. "I have discomfort in the right upper part of my abdomen."

3. The nurse is caring for a 57-year-old patient with ascites due to liver insufficiency. The nurse anticipates that the physician will use which therapeutic regimen to reduce portal hypertension?
   1. Vascular shunting of the portal venous systems
   2. Repeated abdominal paracentesis
   3. Diet restrictions and nutrient supplementation
   4. Fluid replacement therapy

4. The patient with high levels of serum ammonia asks, "Why do I have to continue taking lactulose?" What is the best response?
   1. "It destroys ammonia-producing bacteria in the intestines."
   2. "It reduces intestinal absorption of ammonia."
   3. "It corrects vitamin B_1 deficiency."
   4. "It is used in preparation for a diagnostic test."

5. The nurse is caring for a patient who underwent a recent *liver* transplantation. The nurse reinforces the teaching related to self-care. Which patient statement indicates a need for further instructions?
   1. "I need to report any kind of pain associated with fever and changes in stool color."
   2. "I should expect continued jaundice of the skin and dark yellow colored urine."
   3. "Strict hand hygiene is critical in changing dressings."
   4. "I will need to take these medications for the rest of my life."

6. The nurse is caring for a patient who underwent radical pancreaticoduodenectomy. Which postoperative complication would be the most likely to occur and cause the greatest concern?
   1. Hypoglycemia
   2. Adhesions
   3. Hemorrhage
   4. Anorexia

7. Which statement by the patient indicates a need for further instructions regarding preventing the spread of hepatitis A?
   1. "Bleach solutions must be used to clean the bathroom."
   2. "Somebody else should be doing the cooking right now."
   3. "I can share bath and hand towels with the rest of the family."
   4. "Good hand hygiene prevents the likelihood of passing the virus."

8. A patient has cirrhosis of the liver and ascites. The nurse should question which order?
   1. Bed rest with bathroom privileges
   2. Discontinue furosemide (Lasix) 80 mg
   3. Give 2-g sodium diet
   4. Fluid restriction 1500 mL/24 hr

9. The patient with acute pancreatitis has a bluish discoloration around the umbilicus. What is the significance of this finding?
   1. Associated with respiratory distress
   2. Indicative of infection
   3. Related to biliary obstruction
   4. Suggestive of internal bleeding

10. One goal of nursing care for a patient during the acute phase of pancreatitis is reduction of pain. Which nursing interventions help alleviate pain? *(Select all that apply.)*
    1. Reinforce use of the PCA pump.
    2. Maintain intravenous fluids as ordered.
    3. Provide a bland diet with additional fluids.
    4. Administer dicyclomine (Bentyl).
    5. Give pancreatic enzymes.
    6. Place the patient in a supine position.

Critical Thinking Activities

Scenario A

Mr. Moser is admitted to the hospital with a diagnosis of cirrhosis of the liver. He is 59 years old and has been hospitalized several times for his condition. He suffers from shortness of breath as a result of a swollen and enlarged abdomen, is anemic because of minimal but constant esophageal bleeding, and appears jaundiced. He has severe abrasions on his arms, legs, and abdomen from repeated scratching to relieve his pruritus. Mr. Moser is very depressed and will not converse with you when you enter his room with his breakfast tray the first morning you are assigned to his care. He refuses to eat and indicates his attitude by pushing the tray away and turning on his side, face to the wall.

1. What nursing measures might help relieve some of Mr. Moser's problems?
2. Why do you think he is mentally depressed?
3. How would you go about helping him emotionally?
4. What special observations must you make while caring for Mr. Moser?
5. How would you explain a paracentesis to Mr. Moser if one were ordered for him?

Scenario B

Mrs. Lincoln, age 46, is admitted to the hospital for a laparoscopic cholecystectomy. She is extremely obese and enjoys eating rich, fatty foods, even though she knows this will add to her obesity and precipitate attacks of cholecystitis. You are assigned to care for Mrs. Lincoln when she returns from surgery.

1. How will you position this patient?
2. What would you need to assess to determine whether complications are occurring?
3. What would you need to teach the patient and family before discharge?
4. What problems might occur after discharge? What should be the diet for Mrs. Lincoln?
5. How soon will Mrs. Lincoln probably be able to resume most of her usual activities?

Scenario C

You are working in an employee health clinic and taking a health history from Mr. Austin, who is 52 years old. He reports that he has chronic pancreatitis.

1. What physical signs and symptoms should you ask about?
2. What questions should you ask about diet and lifestyle?

chapter 32

The Musculoskeletal System

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Objectives

Theory

1. Recall the normal anatomy of the musculoskeletal system.
2. Describe how the musculoskeletal system provides the function of motion.
3. Explain how the musculoskeletal system provides protection for the body.
4. Identify the steps included in a nursing assessment of the musculoskeletal system.
5. Discuss the following diagnostic tests: bone scan, arthroscopy, electromyography.
6. List ways in which the elderly can increase musculoskeletal strength and protect bones.

Clinical Practice

1. Gather positioning aids and place them correctly for the patient who has sustained trauma to the left knee.
2. Institute measures to reduce the chance of contracture for patients with musculoskeletal injuries.
3. Assist patients with musculoskeletal injuries with active or passive range of motion.
4. Provide care for a patient who has undergone an arthroscopy.
5. Teach a patient to properly use crutches.
6. Teach an elderly patient with a mobility problem about ways to prevent a fall at home.

Key Terms

ankylosis (ăng-kĭ-LŌ-sĭs, p. 728)
cartilage (KĂR-tĭ-lăzh, p. 716)
contractures (kŏn-TRĂK-chŭrz, p. 727)
crepitation (KRĔP-ĭ-tā-shŭn, p. 718)
isometric exercises (ī-sō-MĔT-rĭk, p. 728)
kyphosis (kī-PHŌ-sĭs, p. 724)
ligaments (LĬG-ă-mĕntz, p. 716)
orthopedic (ŏr-thō-PĒ-dĭk, p. 719)
ossification (ŏs-ĭ-fĭ-KĀ-shŭn, p. 718)
tendons (TĔN-dŏnz, p. 716)

OVERVIEW OF ANATOMY AND PHYSIOLOGY OF THE MUSCULOSKELETAL SYSTEM

WHAT ARE THE STRUCTURES OF THE MUSCULOSKELETAL SYSTEM?

- The musculoskeletal system consists of the bones, joints, cartilage, ligaments, tendons, and muscles.
- There are two distinct groups of bone cells; those that are transformed into mature cells and those bone cells which form cartilage first, and then are gradually replaced by mature bone cells as the person grows older.
- A total of 206 bones make up the human skeleton (Figure 32-1).
- Bone is either compact or spongy. Spongy bone contains red bone marrow (Figure 32-2).
- Bones are classified as long, short, flat, or irregular.
- Each bone has markings on its surface that make it unique (Table 32-1).
- The haversian system is a canal system that runs through the bone and contains the blood and lymph vessels.
- A joint is the articulation point between two or more bones of the skeleton. There are immovable, slightly movable, and freely movable joints.
- **Ligaments** join the bones of a joint together.
- **Tendons** are connective tissues that provide joint movement.
- **Cartilage** is a type of connective tissue in which fibers and cells are embedded in a semisolid gel material. Cartilage acts as a cushion. The meniscus in the knee joint is a type of cartilage.
- A bursa is a fluid-filled sac that provides cushioning at friction points in a freely movable joint.
- Skeletal muscle is made up of hundreds of muscle fibers bundled together surrounded by a connective tissue sheath.
- Fascia is a connective tissue that surrounds and separates the muscles.