Assessment and Management of Patients With Biliary Disorders

Anatomic and Physiologic Overview

- A pear-shaped, hollow, saclike organ, 7.5 to 10 cm long, lies in a shallow depression on the inferior surface of the liver, to which it is attached by loose connective tissue.
- The capacity of the gallbladder is 30 to 50 mL of bile.
- The gallbladder is connected to the common bile duct by the cystic duct.

Function of gallbladder

- Functions as a storage depot for bile.
- During storage, a large portion of the water in bile is absorbed, so that gallbladder bile is five to ten times more concentrated.
- When food enters the duodenum, the gallbladder contracts and the sphincter of Oddi relaxes and allows the bile to enter the intestine.
- This response is mediated by secretion of the hormone cholecystokinin-pancreozymin (CCK-PZ) from the intestinal wall.
- The bile salts assist in emulsification of fats in the distal ileum.

THE PANCREAS

- The pancreas, located in the upper abdomen, has endocrine as well as exocrine functions. The secretion of pancreatic enzymes into the gastrointestinal tract through the pancreatic duct represents its exocrine function. The secretion of insulin, glucagon, and somatostatin directly into the bloodstream represents its endocrine function.
Exocrine Pancreas

- The secretions of the exocrine portion of the pancreas are collected in the pancreatic duct, which joins the common bile duct and enters the duodenum at the ampulla of Vater. Surrounding the ampulla is the sphincter of Oddi, which partially controls the rate at which secretions from the pancreas and the gallbladder enter the duodenum.

Exocrine Pancreas

- The secretions of the exocrine pancreas are digestive enzymes high in protein content and an electrolyte-rich fluid. The secretions are very alkaline because of their high concentration of sodium bicarbonate and are capable of neutralizing the highly acid gastric juice that enters the duodenum.
- The enzyme secretions include amylase, which aids in the digestion of carbohydrates; trypsin, which aids in the digestion of proteins; and lipase, which aids in the digestion of fats.

Endocrine Pancreas

- The islets of Langerhans, the endocrine part of the pancreas, are collections of cells embedded in the pancreatic tissue.
- They are composed of alpha, beta, and delta cells. The hormone produced by the beta cells is called insulin; the alpha cells secrete glucagon and the delta cells secrete somatostatin.

1. INSULIN

- A major action of insulin is to lower blood glucose by permitting entry of the glucose into the cells of the liver, muscle, and other tissues, where it is either stored as glycogen or used for energy. Insulin also promotes the storage of fat in adipose tissue and the synthesis of proteins in various body tissues. In the absence of insulin, glucose cannot enter the cells and is excreted in the urine.
2. GLUCAGON

- The effect of glucagon (opposite to that of insulin) is chiefly to raise the blood glucose by converting glycogen to glucose in the liver. Glucagon is secreted by the pancreas in response to a decrease in the level of blood glucose.

3. SOMATOSTATIN

- Somatostatin exerts a hypoglycemic effect by interfering with release of growth hormone from the pituitary and glucagon from the pancreas, both of which tend to raise blood glucose levels.

Endocrine Control of Carbohydrate Metabolism

- Glucose for body energy needs is derived by metabolism of ingested carbohydrates and also from proteins by the process of gluconeogenesis. Glucose can be stored temporarily in the liver, muscles, and other tissues in the form of glycogen. The endocrine system controls the level of blood glucose by regulating the rate at which glucose is synthesized, stored, and moved to and from the bloodstream. Through the action of hormones, blood glucose is normally maintained at about 100 mg/dL (5.5 mmol/L).

- Insulin is the primary hormone that lowers the blood glucose level. Hormones that raise the blood glucose level are glucagon, epinephrine, adrenocorticosteroids, growth hormone, and thyroid hormone.
The major exocrine function is to facilitate digestion through secretion of enzymes into the proximal duodenum. Secretin and CCK-PZ are hormones from the gastrointestinal tract that aid in the digestion of food substances by controlling the secretions of the pancreas. Neural factors also influence pancreatic enzyme secretion. Considerable dysfunction of the pancreas must occur before enzyme secretion decreases and protein and fat digestion becomes impaired. Pancreatic enzyme secretion is normally 1,500 to 2,500 mL/day.

**Definition of Terms: Biliary**

- **Cholecystitis**: inflammation of the gallbladder
- **Cholelithiasis**: the presence of calculi in the gallbladder
- **Cholecystectomy**: removal of the gallbladder
- **Cholecystostomy**: opening and drainage of the gallbladder
- **Choledochotomy**: opening into the common duct
- **Choledocholithiasis**: stones in the common duct
- **Choledocholithotomy**: incision of common bile duct for removal of stones

**Cholecystitis**

- Acute inflammation (cholecystitis) of the gallbladder causes pain, tenderness, and rigidity of the upper right abdomen that may radiate to the midsternal area or right shoulder
- Associated with nausea, vomiting, and the usual signs of an acute inflammation
- An empyema of the gallbladder develops if the gallbladder becomes filled with purulent fluid (pus)
- Calculous cholecystitis is the cause of more than 90% of cases of acute cholecystitis
- Gallbladder stone obstructs bile outflow. Bile remaining in the gallbladder initiates a chemical reaction; autolysis and edema occur; and the blood vessels in the gallbladder are compressed, compromising its vascular supply.
- Gangrene of the gallbladder with perforation may result
- Bacteria play a minor role in acute cholecystitis
- Acute cholecystitis occurs after major surgical procedures, severe trauma, or burns
Cholelithiasis

- Gallstones usually form in the gallbladder from the solid constituents of bile.
- Vary greatly in size, shape, and composition.
- Common after 40 years of age, especially in women.

Risk Factors for Cholelithiasis

- Obesity, Women, especially those who have had multiple pregnancies
- Frequent changes in weight
- Rapid weight loss (leads to rapid development of gallstones and high risk of symptomatic disease)
- Treatment with high-dose estrogen (i.e., in prostate cancer)
- Low-dose estrogen therapy—a small increase in the risk of gallstones
- Ileal resection or disease
- Cystic fibrosis
- Diabetes mellitus

Pathophysiology

- There are two major types of gallstones:
  1. Composed of pigment.
     - Probably form when unconjugated pigments in the bile precipitate to form stones.
     - The risk is increased in patients with cirrhosis, hemolysis, and infections of the biliary tract.
     - Pigment stones cannot be dissolved and must be removed surgically.
  2. Composed of cholesterol.
     - Four times more women than men develop cholesterol stones and gallbladder disease; the women are usually older than 40, multiparous, and obese.
     - The incidence rises with oral contraceptives, estrogens.

Clinical Manifestations

- Gallstones may be silent with only mild GI symptoms. Such stones may be detected incidentally.
- Symptoms are due to the disease of the gallbladder itself or to obstruction of the bile passages by a gallstone.
- The symptoms may be acute or chronic.
- Epigastric distress, such as fullness, abdominal distention, and vague pain in the right upper quadrant of the abdomen, may occur. This distress may follow a meal rich in fried or fatty foods.
A. Pain and Biliary Colic

- If a gallstone obstructs the cystic duct, the gallbladder becomes distended, inflamed, and eventually infected (acute cholecystitis).
- The patient develops fever and may have a palpable abdominal mass.
- The patient may have biliary colic with excruciating upper right abdominal pain that radiates to the back or right shoulder.
- It is usually associated with nausea and vomiting, and is noticeable several hours after a heavy meal.

B. Jaundice

- Jaundice occurs in a few patients with gallbladder disease and usually occurs with obstruction of the common bile duct.

C. Changes in Urine and Stool Color

- The excretion of the bile pigments by the kidneys gives the urine a very dark color. The feces, no longer colored with bile pigments, are grayish, clay-colored.

D. Obstruction of bile flow also interferes with absorption of the fat-soluble vitamins. The patient may exhibit deficiencies (e.g., bleeding caused by vitamin K deficiency) of these vitamins if biliary obstruction has been prolonged.

Assessment and Diagnostic Findings

- Abdominal X-ray
- Ultrasonography
- Cholecystography
- Endoscopic retrograde cholangiopancreatography (ERCP)
- Percutaneous transhepatic cholangiography

- Endoscopic retrograde cholangiopancreatography (ERCP). A fiberoptic duodenoscope, with side-viewing apparatus, is inserted into the duodenum. The ampulla of Vater is catheterized and the biliary tree injected with contrast agent. The pancreatic ductal system is also assessed, if indicated. This procedure is of special value in visualizing neoplasms of the ampulla area and extracting a biopsy specimen.
Medical Management

- The major objectives of medical therapy are to reduce the incidence of acute episodes of gallbladder pain and cholecystitis by supportive and dietary management and, if possible, to remove the cause of cholecystitis by pharmacologic therapy, endoscopic procedures, or surgical intervention.
- Removal of the gallbladder (cholecystectomy)
  - Traditional surgical approaches
  - Laparoscopic cholecystectomy (removal of the gallbladder through a small incision through the umbilicus) reduces surgical risks, length of hospital stay and recovery period.

NUTRITIONAL AND SUPPORTIVE THERAPY

- Approximately 80% of the patients with acute gallbladder inflammation achieve remission with rest, intravenous fluids, nasogastric suction, analgesia, and antibiotic agents. Unless the patient’s condition deteriorates, surgical intervention is delayed until the acute symptoms subside.
- Ursodeoxycholic acid given to dissolve the stone.
- Stone Removal by Instrumentation
  1. A catheter and instrument with a basket.
  2. The use of the ERCP endoscope.
- Lithotripsy

![Non-surgical techniques for removing gallstones.](image)
SURGICAL MANAGEMENT

- A chest x-ray, electrocardiogram, and liver function tests may be performed in addition to x-ray studies of the gallbladder. Vitamin K may be administered if the prothrombin level is low. Blood component therapy may be administered before surgery. Nutritional requirements are considered; if the nutritional status is suboptimal, it may be necessary to provide intravenous glucose with protein hydrolysate supplements to aid wound healing and help prevent liver damage. Preparation for gallbladder surgery is similar to that for any upper abdominal laparotomy or laparoscopy.

Cholecystectomy

- In this procedure, the gallbladder is removed through an abdominal incision (usually right subcostal) after the cystic duct and artery are ligated. The procedure is performed for acute and chronic cholecystitis. In some patients a drain may be placed close to the gallbladder bed and brought out through a puncture wound if there is a bile leak. The drain type is chosen based on the physician's preference. A small leak should close spontaneously in a few days with the drain preventing accumulation of bile.

Choledochostomy

- Involves an incision into the common duct, usually for removal of stones. After the stones have been evacuated, a tube usually is inserted into the duct for drainage of bile until edema subsides.
- This tube is connected to gravity drainage tubing.
- The gallbladder also contains stones, and as a rule a cholecystectomy is performed at the same time.
Percutaneous cholecystostomy

- has been used in the treatment and diagnosis of acute cholecystitis in patients who are poor risks for any surgical procedure or for general anesthesia. These may include patients with sepsis or severe cardiac, renal, pulmonary, or liver failure.
- Under local anesthesia, a fine needle is inserted through the abdominal wall and liver edge into the gallbladder under the guidance of ultrasound or computed tomography. Bile is aspirated to ensure adequate placement of the needle, and a catheter is inserted into the gallbladder to decompress the biliary tract.

Disorders of the Pancreas

- **Pancreatitis** (inflammation of the pancreas) is a serious disorder. It can be acute or chronic.
- Acute pancreatitis can be a medical emergency associated with a high risk for life-threatening complications and mortality.
- It does not usually lead to chronic pancreatitis. However, chronic pancreatitis can be characterized by acute episodes. Typically, patients are men 40 to 45 years of age with a history of alcoholism or women 50 to 55 years of age with a history of biliary disease.
- Etiology is unknown, but it could be related to obstruction that causes pack up of pancreatic enzymes, along with bile, they cause autodigestion.

Group Discussion

- **NURSING PROCESS:**
- **THE PATIENT UNDERGOING SURGERY FOR GALLBLADDER DISEASE**

Acute Pancreatitis

- Ranges from a mild, self-limiting to severe.
- Mild acute pancreatitis is characterized by edema and inflammation of the pancreas. Minimal organ dysfunction is present, and return to normal usually occurs within 6 months.
- Patient is acutely ill and at risk for hypovolemic shock, fluid and electrolyte disturbances, and sepsis. The tissue becomes necrotic with possible abscess formation.
- Systemic complications, such as acute respiratory distress syndrome, shock, DIC, & pleural effusion, can increase the mortality rate to 50% or higher.
Pathophysiology

- Self-digestion of the pancreas by its own proteolytic enzymes, principally trypsin, causes acute pancreatitis.
- 80% of patients with acute pancreatitis have biliary tract disease; but only 5% of patients with gallstones develop pancreatitis. Gallstones enter the common bile duct and lodge at the ampulla of Vater, obstructing the flow of pancreatic juice or causing a reflux of bile from the common bile duct into the pancreatic duct, thus activating the powerful enzymes within the pancreas which leads to vasodilation, increased vascular permeability, necrosis, erosion, and hemorrhage.

Clinical Manifestations

- Severe abdominal pain is the major symptom that causes the patient to seek medical care. Typically, the pain occurs in the midepigastrium.
- Pain is frequently acute in onset, occurring 24 to 48 hours after a very heavy meal or alcohol ingestion, and it may be diffuse and difficult to localize. It is generally more severe after meals and is unrelieved by antacids.
- The patient appears acutely ill. Abdominal guarding is present. A rigid or board-like abdomen may develop and is generally an ominous sign; the abdomen may remain soft in the absence of peritonitis.

Clinical Manifestations

- Other less common causes of pancreatitis include bacterial or viral infection i.e. mumps virus.
- Spasm and edema of the ampulla of Vater, resulting from duodenitis.
- Blunt abdominal trauma, peptic ulcer disease, ischemic vascular disease, hyperlipidemia, hypercalcemia, and the use of corticosteroids, thiazide diuretics, and oral contraceptives.
- Ecchymosis (bruising) in the flank or around the umbilicus may indicate severe pancreatitis.
- Nausea and vomiting are common. The emesis is usually gastric in origin but may also be bile-stained.
- Fever, jaundice, mental confusion, and agitation also may occur.
- Respiratory distress & hypoxia are common, the patient may develop dyspnea, tachypnea, and abnormal blood gas values.
- Myocardial depression, hypocalcemia, hyperglycemia, and disseminated intravascular coagulopathy (DIC) may also occur.
Assessment and Diagnostic Findings

- History of abdominal pain, the presence of known risk factors,
- In 90% of the cases, serum amylase and lipase levels usually rise in excess of three times their normal upper limit within 24 hours
- Serum amylase usually returns to normal within 48 to 72 hours. Serum lipase levels may remain elevated for 7 to 14 days
- Urinary amylase levels elevated and remain elevated longer than serum amylase levels.
- WBC is usually elevated.

Criteria for Predicting Severity of Pancreatitis

<table>
<thead>
<tr>
<th>Criteria on Admission to Hospital</th>
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<tr>
<td>Age &gt;55 years</td>
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<tr>
<td>WBC &gt;16,000 mm⁻¹</td>
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<tr>
<td>Serum glucose &gt;200 mg/dL (&gt;11.1 mmol/L)</td>
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<tr>
<td>Serum LDH &gt;350 IU/L (&gt;350 U/L)</td>
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<tr>
<td>AST &gt;250 U/ml (120 U/L)</td>
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<tr>
<td>Criteria Within 48 Hours of Hospital Admission</td>
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<tr>
<td>Fall in hemocrit &gt;10% (&gt;0.10)</td>
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<tr>
<td>BUN increase &gt;5 mg/dL (&gt;1.7 mmol/L)</td>
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<tr>
<td>Serum calcium &lt;8 mg/dL (&lt;2.0 mmol/L)</td>
</tr>
<tr>
<td>Base deficit &gt;4 mEq/L (&gt;4 mmol/L)</td>
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<tr>
<td>Fluid retention or sequestration &gt;6 L</td>
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<td>PO₂ &lt;60 mm Hg</td>
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Two or fewer signs: 1% mortality; 3 or 4 signs: 15% mortality; 5 or 6 signs: 40% mortality; >6 signs: 100% mortality.

Medical Management

- Hypocalcemia is present in many patients and correlates well with the severity of pancreatitis.
- Transient hyperglycemia and glucosuria and elevated serum bilirubin levels occur in some patients with acute pancreatitis.
- X-ray.
- Ultrasound and CT scans.
- Hematocrit and hemoglobin levels to monitor for bleeding.
- Peritoneal fluid may contain increased levels of pancreatic enzymes.
- The stools are often bulky, pale, and foul-smelling. Fat content of stools varies between 50% and 90% in pancreatic disease; normally, the fat content is 20%.

- Management of the patient with acute pancreatitis is directed toward relieving symptoms and preventing or treating complications. All oral intake is withheld to inhibit pancreatic stimulation and secretion of pancreatic enzymes.
- Parenteral nutrition is usually an important part of therapy. Nasogastric suction may be used to relieve nausea and vomiting, to decrease painful abdominal distention and paralytic ileus, and to remove hydrochloric acid so that it does not enter the duodenum and stimulate the pancreas.
- Histamine-2 (H2) antagonists to decrease pancreatic activity by inhibiting HCl secretion.
PAIN MANAGEMENT

- Adequate pain medication is essential during the course of acute pancreatitis to provide sufficient pain relief and minimize restlessness, which may stimulate pancreatic secretion further. Morphine and morphine derivatives are often avoided because it has been thought that they cause spasm of the sphincter of Oddi; meperidine (Demerol) is often prescribed because it is less likely to cause spasm of the sphincter.

INTENSIVE CARE

- Correction of fluid and blood loss and low albumin levels is necessary to maintain fluid volume and prevent renal failure. The patient is usually acutely ill and is monitored in the intensive care unit, where hemodynamic monitoring and arterial blood gas monitoring are initiated. Antibiotic agents may be prescribed if infection is present; insulin may be required if significant hyperglycemia occurs.

RESPIRATORY CARE

- Aggressive respiratory care is indicated because of the high risk for elevation of the diaphragm, pulmonary infiltrates and effusion, and atelectasis. Hypoxemia occurs in a significant number of patients with acute pancreatitis even with normal x-ray findings. Respiratory care may range from close monitoring of arterial blood gases to use of humidified oxygen to intubation and mechanical ventilation.

BILIARY DRAINAGE

- Placement of biliary drains (for external drainage) and stents (indwelling tubes) in the pancreatic duct through endoscopy has been performed to reestablish drainage of the pancreas. This has resulted in decreased pain and increased weight gain.
SURGICAL INTERVENTION

- Although often risky because the acutely ill patient is a poor surgical risk, surgery may be performed to assist in the diagnosis of pancreatitis (diagnostic laparotomy), to establish pancreatic drainage, or to resect or débride a necrotic pancreas. The patient who undergoes pancreatic surgery may have multiple drains in place postoperatively as well as a surgical incision that is left open for irrigation and repacking every 2 to 3 days to remove necrotic debris.

POSTACUTE MANAGEMENT

- Antacids may be used when acute pancreatitis begins to resolve. Oral feedings low in fat and protein are initiated gradually. Caffeine and alcohol are eliminated from the diet. If the episode of pancreatitis occurred during treatment with thiazide diuretics, corticosteroids, or oral contraceptives, these medications are discontinued.

- Follow-up of the patient may include ultrasound, x-ray studies, or ERCP to determine whether the pancreatitis is resolving and to assess for abscesses and pseudocysts.

CHRONIC PANCREATITIS

- is an inflammatory disorder characterized by progressive anatomic and functional destruction of the pancreas.

- As cells are replaced by fibrous tissue with repeated attacks of pancreatitis, pressure within the pancreas increases. The end result is mechanical obstruction of the pancreatic and common bile ducts and the duodenum. Additionally, there is atrophy of the epithelium of the ducts, inflammation, and destruction of the secreting cells of the pancreas.

- Alcohol consumption in Western societies and malnutrition worldwide are the major causes of chronic pancreatitis. Excessive and prolonged consumption of alcohol accounts for approximately 70% of the cases.
The incidence of pancreatitis is 50 times greater in alcoholics than in the nondrinking population. Long-term alcohol consumption causes hypersecretion of protein in pancreatic secretions, resulting in protein plugs and calculi within the pancreatic ducts. Alcohol also has a direct toxic effect on the cells of the pancreas. Damage to these cells is more likely to occur and to be more severe in patients whose diets are poor in protein content and either very high or very low in fat.

**Clinical Manifestations**

- characterized by recurring attacks of severe upper abdominal and back pain, accompanied by vomiting. Attacks are often so painful that opioids, even in large doses, do not provide relief. As the disease progresses, recurring attacks of pain are more severe, more frequent, and of longer duration.

**Assessment and Diagnostic Findings**

- Weight loss is a major problem in chronic pancreatitis: more than 75% of patients experience significant weight loss, usually caused by decreased dietary intake secondary to anorexia or fear that eating will precipitate another attack. Malabsorption occurs late in the disease, when as little as 10% of pancreatic function remains. As a result, digestion, especially of proteins and fats, is impaired. The stools become frequent, frothy, and foul-smelling because of impaired fat digestion.

- ERCP is the most useful study in the diagnosis of chronic pancreatitis. It provides detail about the anatomy of the pancreas and the pancreatic and biliary ducts. It is also helpful in obtaining tissue for analysis and differentiating pancreatitis from other conditions, such as carcinoma.

- Magnetic resonance imaging, computed tomography, and ultrasound, have been useful in the diagnostic evaluation of patients with suspected pancreatic disorders.

- A glucose tolerance test evaluates pancreatic islet cell function, information necessary for making decisions about surgical resection of the pancreas. An abnormal glucose tolerance test indicative of diabetes may be present.

As a result, digestion, especially of proteins and fats, is impaired. The stools become frequent, frothy, and foul-smelling because of impaired fat digestion,
Medical Management

- The management of chronic pancreatitis depends on its probable cause in each patient. Treatment is directed toward preventing and managing acute attacks, relieving pain and discomfort, and managing exocrine and endocrine insufficiency of pancreatitis.

NONSURGICAL MANAGEMENT

- Nonsurgical approaches may be indicated for the patient who refuses surgery, who is a poor surgical risk, or whose disease and symptoms do not warrant surgical intervention. Endoscopy to remove pancreatic duct stones and stent strictures may be effective in selected patients to manage pain and relieve obstruction.
- Focus is usually on the use of nonopioid methods to manage pain. Diabetes mellitus resulting from dysfunction of the pancreatic islet cells is treated with diet, insulin, or oral antidiabetic agents.

SURGICAL MANAGEMENT

- Surgery is generally carried out to relieve abdominal pain and discomfort, restore drainage of pancreatic secretions, and reduce the frequency of acute attacks of pancreatitis. The surgery performed depends on the anatomic and functional abnormalities of the pancreas, including the location of disease within the pancreas, diabetes, exocrine insufficiency, biliary stenosis, and pseudocysts of the pancreas.
- Pancreateicojejunostomy (also referred to as Roux-en-Y) with a side-to-side anastomosis or joining of the pancreatic duct to the jejunum allows drainage of the pancreatic secretions into the jejunum.

- Other surgical procedures may be performed for different degrees and types of disease, ranging from revision of the sphincter of the ampulla of Vater, to internal drainage of a pancreatic cyst into the stomach, to insertion of a stent, to wide resection or removal of the pancreas. A Whipple resection (pancreateoduodenectomy) has been carried out to relieve the pain of chronic pancreatitis.
- Autotransplantation or implantation of the patient’s pancreatic islet cells has been attempted to preserve the endocrine function of the pancreas in patients who have undergone total pancreatectomy.
PANCREATIC CYSTS

- As a result of the local necrosis that occurs at the time of acute pancreatitis, collections of fluid may form in the vicinity of the pancreas. These become walled off by fibrous tissue and are called pancreatic pseudocysts. They are the most common type of pancreatic cysts. Less common cysts occur as a result of congenital anomalies or are secondary to chronic pancreatitis or trauma to the pancreas.

Diagnosis of pancreatic cysts and pseudocysts is made by ultrasound, computed tomography, and ERCP. ERCP may be used to define the anatomy of the pancreas and evaluate the patency of pancreatic drainage. Pancreatic pseudocysts may be of considerable size. Because of their location behind the posterior peritoneum, when they enlarge they impinge on and displace the stomach or the colon, which are adjacent. Eventually, through pressure or secondary infection, they produce symptoms and require drainage.

CANCER OF THE PANCREAS

- The incidence of pancreatic cancer has decreased slightly over the past 25 years in non-Caucasian men. It is the fifth leading cause of cancer deaths in the United States and occurs most frequently in the fifth to seventh decades of life. Cigarette smoking, exposure to industrial chemicals or toxins in the environment, and a diet high in fat, meat, or both are associated with pancreatic cancer, although their role is not completely clear. The risk for pancreatic cancer increases as the extent of cigarette smoking increases. Diabetes mellitus, chronic pancreatitis, and hereditary pancreatitis are also associated.

Cancer may arise in any portion of the pancreas (in the head, the body, or the tail); clinical manifestations vary depending on the location of the lesion and whether functioning, insulin-secreting pancreatic islet cells are involved. Approximately 75% of pancreatic cancers originate in the head of the pancreas and give rise to a distinctive clinical picture. Functioning islet cell tumors, whether benign (adenoma) or malignant (carcinoma), are responsible for the syndrome of hyperinsulinism.
Clinical Manifestations

- Pain, jaundice, or both are present in more than 90% of patients and, along with weight loss, are considered classic signs of pancreatic carcinoma. However, they often do not appear until the disease is far advanced. Other signs include rapid, profound, and progressive weight loss as well as vague upper or midabdominal pain or discomfort that is unrelated to any gastrointestinal function and is often difficult to describe.

Clinical Manifestations

- An important sign, when present, is the onset of symptoms of insulin deficiency: glucosuria, hyperglycemia, and abnormal glucose tolerance. Thus, diabetes may be an early sign of carcinoma of the pancreas. Meals often aggravate epigastric pain, which usually occurs before the appearance of jaundice and pruritus.

Assessment and Diagnostic Findings

- Magnetic resonance imaging and computed tomography are used to identify the presence of pancreatic tumors. ERCP is also used in the diagnosis of pancreatic carcinoma. Cells obtained during ERCP are sent to the laboratory for examination. Gastrointestinal x-ray findings may demonstrate deformities in adjacent viscera caused by the impinging pancreatic mass. Percutaneous fine-needle aspiration biopsy of the pancreas is used to diagnose pancreatic tumors and confirm the diagnosis.

Assessment and Diagnostic Findings

- Percutaneous transhepatic cholangiography is another procedure that may be performed to identify obstructions of the biliary tract by a pancreatic tumor. Several tumor markers (e.g., CA 19-9, CEA, DU-PAN-2) may be used. Angiography, computed tomography, and laparoscopy may be performed to determine whether the tumor can be removed surgically. Intraoperative ultrasonography has been used to determine if there is metastatic disease to other organs.
Medical Management

- If the tumor is resectable and localized (typically tumors in the head of the pancreas), the surgical procedure to remove it is usually extensive. However, definitive surgical treatment (ie, total excision of the lesion) is often not possible because of the extensive growth when the tumor is finally diagnosed and because of the probable widespread metastases (especially to the liver, lungs, and bones). More often, treatment is limited to palliative measures.

- the patient may be treated with radiation and chemotherapy (fluorouracil and gemcitabine). If the patient undergoes surgery, intraoperative radiation therapy (IORT) may be used to deliver a high dose of radiation to the tumor with minimal injury to other tissues.

Nursing Management

- Pain management and attention to nutritional requirements are important nursing measures to improve the level of comfort. Skin care and nursing measures are directed toward relief of pain and discomfort associated with jaundice, anorexia, and profound weight loss. Specialty mattresses are beneficial and protect bony prominences from pressure. Pain associated with pancreatic cancer may be severe and may require liberal use of opioids;

- specific patient and family teaching indicated varies with the stage of disease and the treatment choices made by the patient. If the patient elects to receive chemotherapy, the nurse focuses teaching on prevention of side effects and complications of the agents used. If surgery is performed to relieve obstruction and establish biliary drainage, teaching addresses management of the drainage system and monitoring for complications.

PROMOTING HOME AND COMMUNITY-BASED CARE

- Specific patient and family teaching indicated varies with the stage of disease and the treatment choices made by the patient. If the patient elects to receive chemotherapy, the nurse focuses teaching on prevention of side effects and complications of the agents used. If surgery is performed to relieve obstruction and establish biliary drainage, teaching addresses management of the drainage system and monitoring for complications.
Continuing Care

- A referral for home care is indicated to help the patient and family deal with the physical problems and discomforts associated with pancreatic cancer and the psychological impact of the disease. The home care nurse assesses the patient’s physical status, fluid and nutritional status, and skin integrity and the adequacy of pain management.

TUMORS OF THE HEAD OF THE PANCREAS

- Sixty to eighty percent of pancreatic tumors occur in the head of the pancreas. Tumors in this region of the pancreas obstruct the common bile duct where the duct passes through the head of the pancreas to join the pancreatic duct and empty at the ampulla of Vater into the duodenum. The tumors producing the obstruction may arise from the pancreas, the common bile duct, or the ampulla of Vater.

Clinical Manifestations

- The obstructed flow of bile produces jaundice, clay-colored stools, and dark urine. Malabsorption of nutrients and fat-soluble vitamins may result from obstruction by the tumor to entry of bile in the gastrointestinal tract. Abdominal discomfort or pain and pruritus may be noted, along with anorexia, weight loss, and malaise.

Assessment and Diagnostic Findings

- Diagnostic studies may include duodenography, angiography by hepatic or celiac artery catheterization, pancreatic scanning, percutaneous transhepatic cholangiography, ERCP, and percutaneous needle biopsy of the pancreas. Results of a biopsy of the pancreas may aid in the diagnosis.
Medical Management

- Before extensive surgery can be performed, a fairly long period of preparation is often necessary because the patient’s nutritional and physical condition is often quite compromised. Various liver and pancreatic function studies are performed. A diet high in protein along with pancreatic enzymes is often prescribed. Preoperative preparation includes adequate hydration, correction of prothrombin deficiency with vitamin K, and treatment of anemia to minimize postoperative complications.

- A biliary-enteric shunt may be performed to relieve the jaundice and, perhaps, to provide time for a thorough diagnostic evaluation. Total pancreatectomy (removal of the pancreas) may be performed if there is no evidence of direct extension of the tumor to adjacent tissues or regional lymph nodes.

- A pancreaticoduodenectomy (Whipple’s procedure or resection) is used for potentially resectable cancer of the head of the pancreas.

- This procedure involves removal of the gallbladder, distal portion of the stomach, duodenum, head of the pancreas, and common bile duct and anastomosis of the remaining pancreas and stomach to the jejunum.

- The result is removal of the tumor, allowing flow of bile into the jejunum. When the tumor cannot be excised, the jaundice may be relieved by diverting the bile flow into the jejunum by anastomosing the jejunum to the gallbladder, a procedure known as cholecystojejunostomy.

*Figure 61-7 Pancreaticoduodenectomy (Whipple’s procedure or resection). End results of the resection of the carcinoma of the head of the pancreas or the ampulla of Vater. The common duct is anastomosed to the end of the jejunum, and the remaining portion of the pancreas and the end of the stomach are remanent to the side of the jejunum.*
The postoperative management of patients who have undergone a pancreatectomy or a pancreaticoduodenectomy is similar to the management of patients after extensive gastrointestinal and biliary surgery.

Nursing Management

- Preoperatively and postoperatively, nursing care is directed toward promoting patient comfort, preventing complications, and assisting the patient to return to and maintain as normal and comfortable a life as possible.
- The nurse closely monitors the patient in the intensive care unit after surgery; the patient will have multiple intravenous and arterial lines in place for fluid and blood replacement as well as for monitoring arterial pressures, and is on a mechanical ventilator in the immediate postoperative period. It is important to give careful attention to changes in vital signs, arterial blood gases and pressures, pulse oximetry, laboratory values, and urine output. The nurse must also consider the patient’s compromised nutritional status and risk for bleeding.

PROMOTING HOME AND COMMUNITY-BASED CARE, Teaching Patients Self-Care.
- Continuing Care.