

Liver, Biliary Tract and Pancreas Problems

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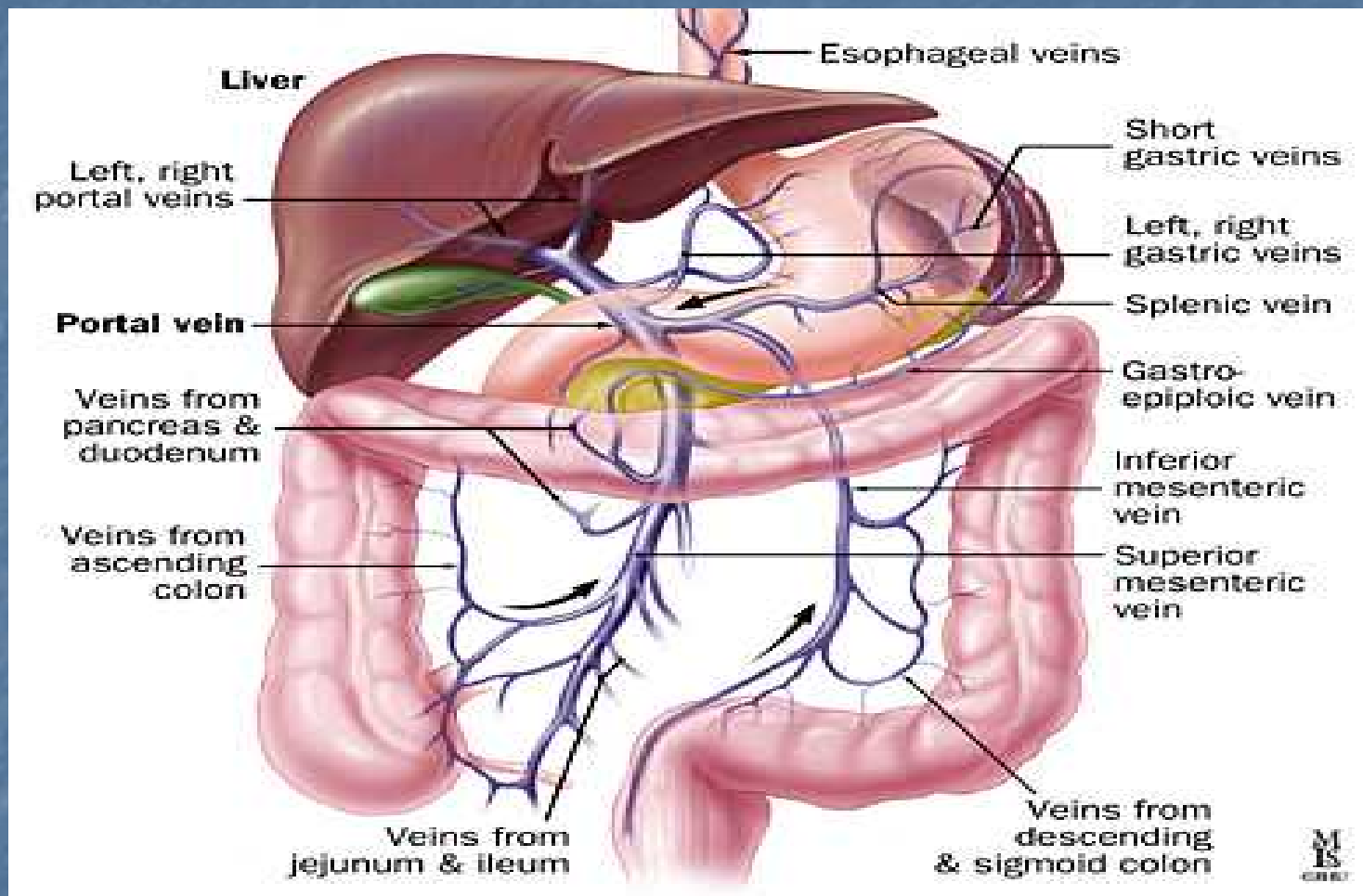
University of kerbala
College of nursing

Outlines

- Function of liver, pancreas, biliary system
- Jaundice
- Cirrhosis & hepatitis
- Portal circulation
- Esophageal varices
- Sengstaken-Blakemore & LeVeen-Peritoneovenous Shunt
- Acute pancreatitis
- Cholelithiasis
- Cholecystitis

Class Objectives:

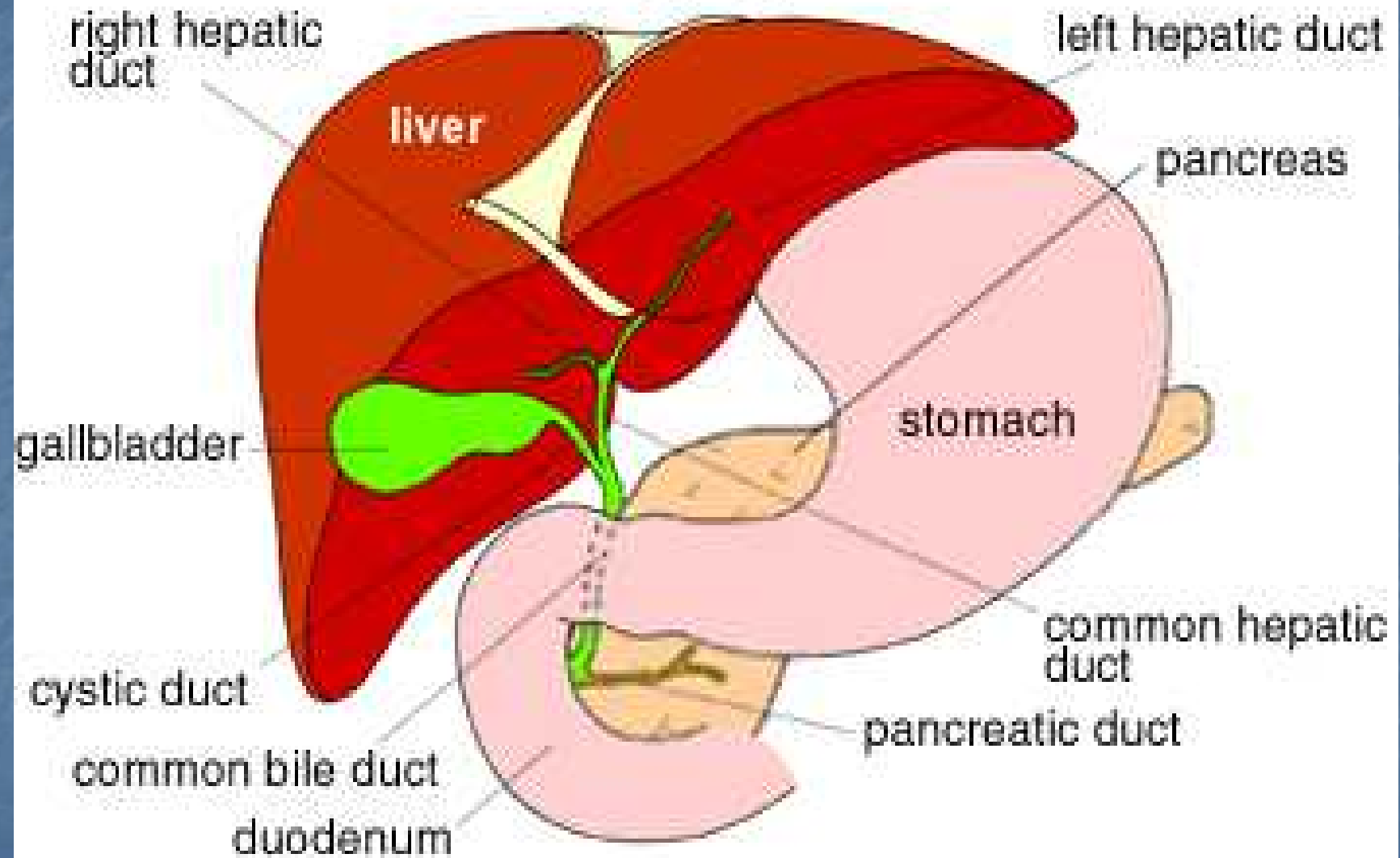
- Identify basic functions of hepatobiliary system and pancreas
- Define jaundice, describe signs and symptoms, nursing/medical management
- Explain the etiology, pathophysiology, manifestations, complications & collaborative care of the client with liver **cirrhosis**
- Describe the nursing care of the clients with cirrhosis and hepatitis
- Describe the types of viral hepatitis, including etiology, pathophysiology, manifestations & collaborative care
- Discuss risk factors and preventative measures for Hepatitis
- Describe the pathophysiology, manifestations, collaborative & nursing care of the client with pancreatitis and gallbladder disease.
- Describe the medical and surgical treatment of cholelithiasis and cholecystitis and nursing care.



- The largest internal organ in humans, the liver is also one of the most important. It has many functions, among them the synthesis of proteins, immune and clotting factors, and oxygen and fat-carrying substances. Its chief digestive function is the secretion of bile, a solution critical to fat emulsion and absorption. The liver also removes excess glucose from circulation and stores it until it is needed.

- It converts excess amino acids into useful forms and filters drugs and poisons from the bloodstream, neutralizing them and excreting them in bile. The liver has two main lobes, located just under the diaphragm on the right side of the body. It can lose 75 percent of its tissue (to disease or surgery) without ceasing to function.

Biliary System



(Black, Hawkes & Keene 2001)

Functions of the liver:

- **Glucose metabolism:** glucose is converted to glycogen, stored in hepatocytes, & released to maintain normal blood glucose.
- **Ammonia conversation:** ammonia (a potential toxin) is a byproduct of glucogenesis and is converted to urea (**In liver**) which can be excreted in the urine. Ammonia produced by intestinal bacteria is also removed from portal blood for urea synthesis/excretion
- **Protein metabolism:** including almost all plasma proteins including:
 - Blood clotting factors are synthesized in the liver. (Vitamin K is required by the liver for synthesis of clotting factors.)
 - Albumin, alpha & beta globulins
 - Transport proteins

Liver function Con't

- **Fat metabolism**: fatty acids can be broken down to for production of energy and ketones. Also produces cholesterol and other complex lipids.
- **Vitamin & iron storage**: A, B, D, B-complex, iron & copper are stored in large amts.
- **Drug and toxin metabolism**: alcohol, barbituates, opioids, sedative agents,, anesthetics,etc.

Function Con't

- **Bile formation:** stored in gallbladder and emptied into intestine as needed
- **Bilirubin excretion:** bilirubin is derived from the breakdown of hemoglobin, removed from the liver, modified to make it more water soluble, and then excreted in the bile.

Prevention of Liver Disease

- No more than two alcoholic drinks a day.
- Be cautious about mixing drinks, combining with drugs OTC & prescription
- Avoid exposure to chemicals whenever possible.
- Maintain a healthful, balanced diet.
- Vaccinate against hepatitis
- No sharing of needles, razors, toothbrushes
- Practicing safer sex will minimize the risk of transmission of hepatitis B.



When things go wrong:



- The problem relates to one of the following
 - portal & hepatic circulatory disturbance
 - hepatobiliary tract disturbance
 - hepatocellular disturbance

TESTS

- Liver Function tests: see text
- Consider: AST, ALT, Alk Phosp, Serum Ammonia & Albumin, Prothrombin time, Cholesterol, Bilirubin

Liver Blood tests

Test	Normal	Clinical Functions
<i>Pigment Studies</i>		
Serum bilirubin, direct	0–5.1 $\mu\text{mol/L}$	These studies measure the ability of the liver to conjugate and excrete bilirubin. Results are abnormal in liver and biliary tract disease and are associated with jaundice clinically.
Serum bilirubin, total	1.7–20.5 $\mu\text{mol/L}$	
Urine bilirubin	0	
Urine urobilinogen	0.09–4.23 $\mu\text{mol/24 h}$	
Fecal urobilinogen (infrequently used)	0.068–0.34 mmol/24 h	

Liver Blood tests

Protein Studies		
Total serum protein	70–75 g/L	Proteins are manufactured by the liver. Their levels may be affected in a variety of liver impairments. Albumin: Cirrhosis Chronic hepatitis Edema, ascites Globulin: Cirrhosis Liver disease Chronic obstructive jaundice Viral hepatitis
Serum albumin	40–55 g/L	
Serum globulin	17–33 g/L	
Serum protein electrophoresis		
Albumin	40–55 g/L	
α_1 -Globulin	1.5–2.5 g/L	
α_2 -Globulin	4.3–7.5 g/L	
β -Globulin	5–10 g/L	
γ -Globulin	6–13 g/L	
Albumin/globulin (A/G) ratio	A > G or 1.5:1–2.5:1	A/G ratio is reversed in chronic liver disease (decreased albumin and increased globulin).
Prothrombin Time	100% or 12–16 seconds	Prothrombin time may be prolonged in liver disease. It will not return to normal with vitamin K in severe liver cell damage.
Serum Alkaline Phosphatase	Varies with method: 2–5 Bodansky units 17–142 U/L at 30°C (20–90 U/L at 30°C)	Serum alkaline phosphatase is manufactured in bones, liver, kidneys, and intestine and excreted through biliary tract. In absence of bone disease, it is a sensitive measure of biliary tract obstruction.

Liver Blood tests

Serum Aminotransferase or Transaminase Studies		
AST (SGOT)	4.8–19 U/L	The studies are based on release of enzymes from damaged liver cells. These enzymes are elevated in liver cell damage.
ALT (SGPT)	2.4–17 U/L	
GGT, GGTP	10–48 U/L	Elevated in alcohol abuse. Marker for biliary cholestasis.
LDH	100–225 U/L	
Serum Ammonia	11.1–67.0 μmol/L 3.90–6.50 mmol/L	Liver converts ammonia to urea. Ammonia level rises in liver failure.
Cholesterol		
Ester	fraction of total cholesterol: 0.60	Cholesterol levels are elevated in biliary obstruction and decreased in parenchymal liver disease.
HDL (high-density lipoprotein)	HDL Male: 0.91–1.81 mmol/L, Female: 0.91–2.20 mmol/L	
LDL (low-density lipoprotein)	LDL < 3.40 mmol/L	

Other Liver tests

Additional Studies	Clinical Functions
Barium study of esophagus	For varices, which indicate increased portal blood pressure
Abdominal x-ray	To determine gross liver size
Liver scan with radiolabeled isotope (technetium, or gallium)	To show size and shape of liver; to show replacement of liver tissue with scars, cysts, or tumour
Cholecystogram and cholangiogram	For gallbladder and bile duct visualization
Celiac axis arteriography	For liver and pancreas visualization
Splenoportogram (splenic portal venography)	To determine adequacy of portal blood flow
Laparoscopy	Direct visualization of anterior surface of liver, gallbladder, and mesentery through a trocar
Liver biopsy (percutaneous or transjugular)	To determine anatomic changes in liver tissue
Measurement of portal pressure	Elevated in cirrhosis of the liver
Esophagoscopy/endoscopy	To search for esophageal varices and other abnormalities
Electroencephalogram	Abnormal in hepatic coma and impending hepatic coma
Ultrasonography	To show size of abdominal organs and presence of masses
Computed tomography (CT scan)	To detect hepatic neoplasms; diagnose cysts, abscesses, and hematomas; and distinguish between obstructive and nonobstructive jaundice. Detects cerebral atrophy in hepatic encephalopathy.
Angiography	Visualizes hepatic circulation and detects presence and nature of hepatic masses
Magnetic resonance imaging (MR)	To detect hepatic neoplasms; diagnose cysts, abscesses, and hematomas. Detects cerebral atrophy in encephalopathy.
Endoscopic retrograde cholangiopancreatography (ERCP)	Visualizes biliary structures via endoscopy

Jaundice

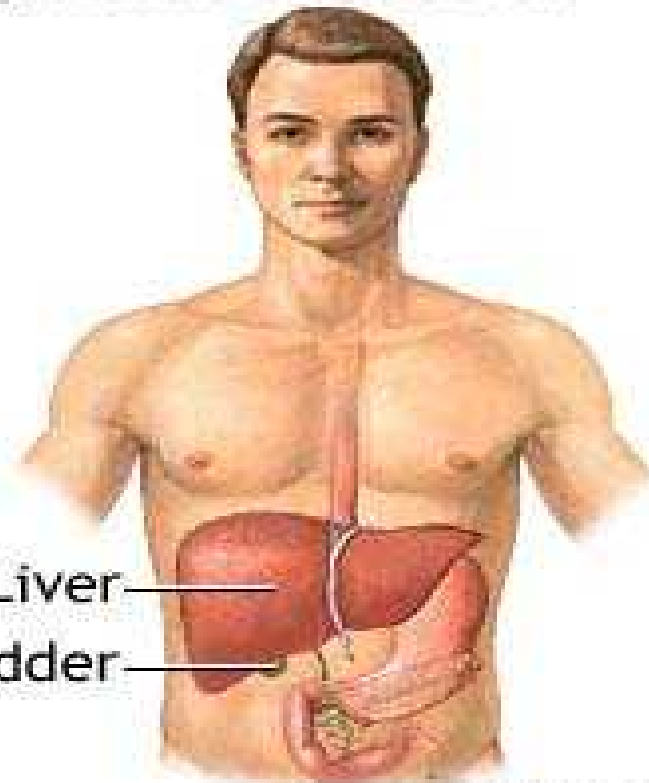
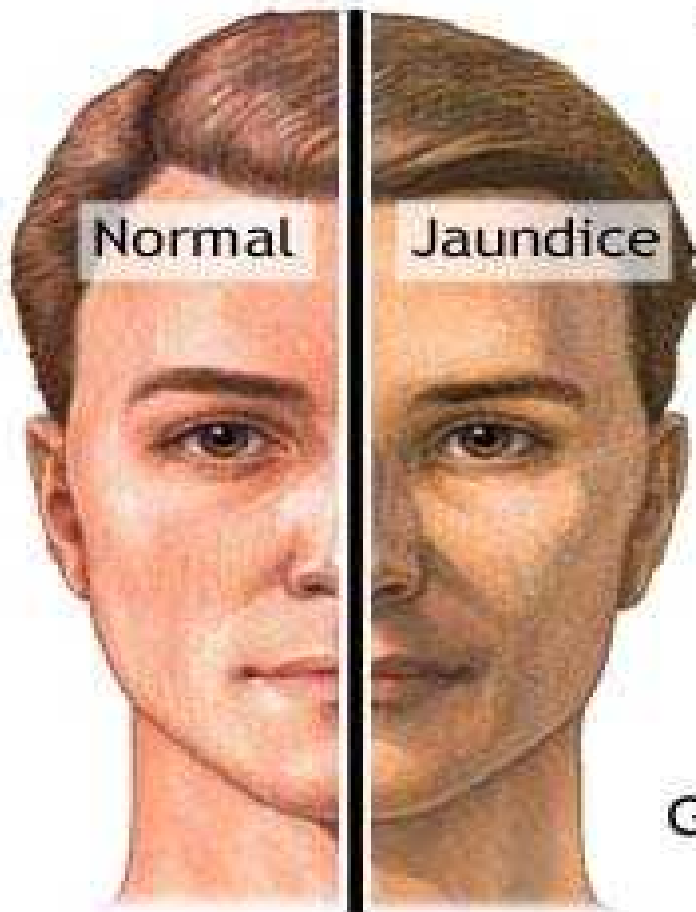
- Defined as: " the yellow pigmentation of sclera, skin, and deeper tissues caused by excessive accumulation of bile pigments in the blood" It is a **symptom** rather than a disease, and results from problems outside the liver or inside the liver.
- **Is a result of excessive bilirubin**

Three types of Jaundice

- **Hemolytic jaundice:** results in increased breakdown of RBCs (blood transfusion reaction)
- **Hepatocellular jaundice:** liver's altered ability to take up bilirubin from blood, conjugate, or excrete it. (hepatitis, cirrhosis)
- **Obstructive jaundice;** impeded outflow of bile through liver & duct system (cholelithiasis, cancer).

Jaundice

Yellowing is from accumulated bilirubin in the skin, often caused by liver and gallbladder disorders



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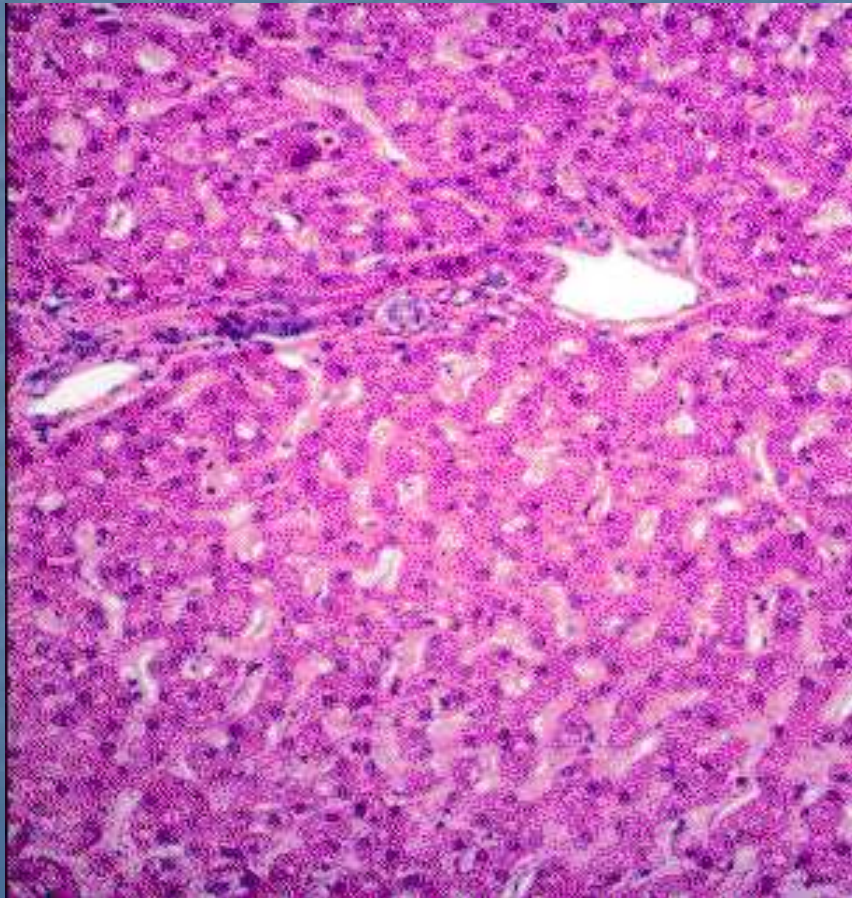


Cirrhosis

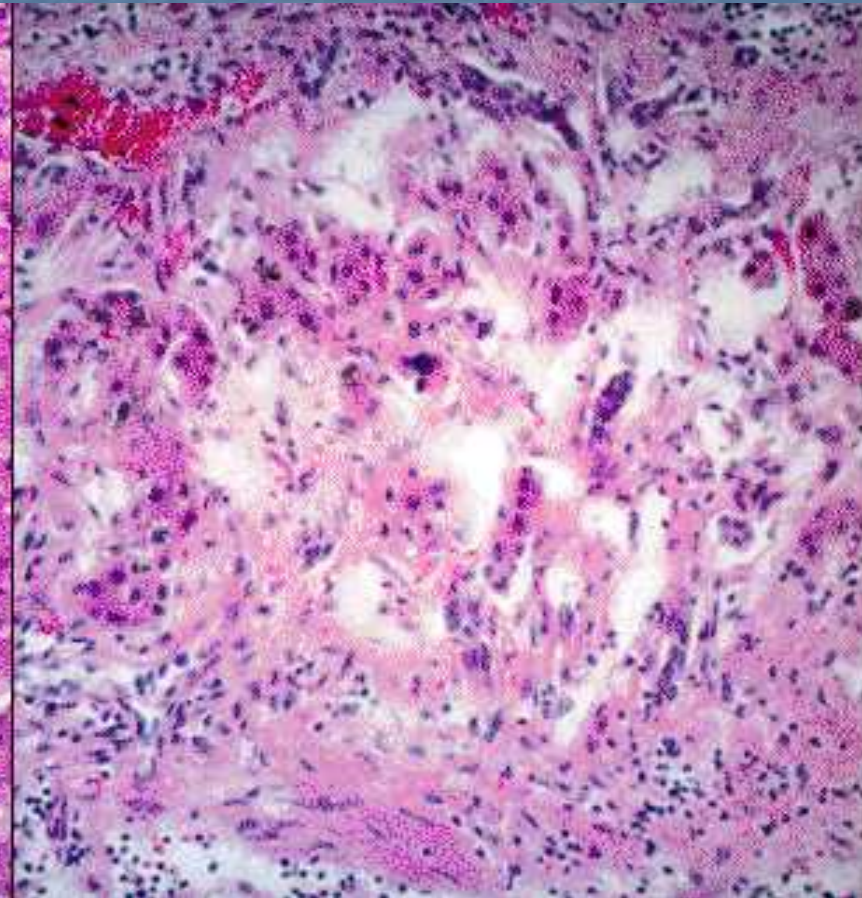
- A chronic disease of the liver marked by pathological formation of widespread fibrosis (scarring) and degenerative changes. Symptoms result from loss of liver cell function, increased resistance to blood flow through liver, leading to **ammonia toxicity**
- **Types** include: **Laennec's** (alcoholic), **postnecrotic** (toxic), **biliary** (obstruction/infection), **cardiac** (severe [®] sided heart failure)

Cirrhosis

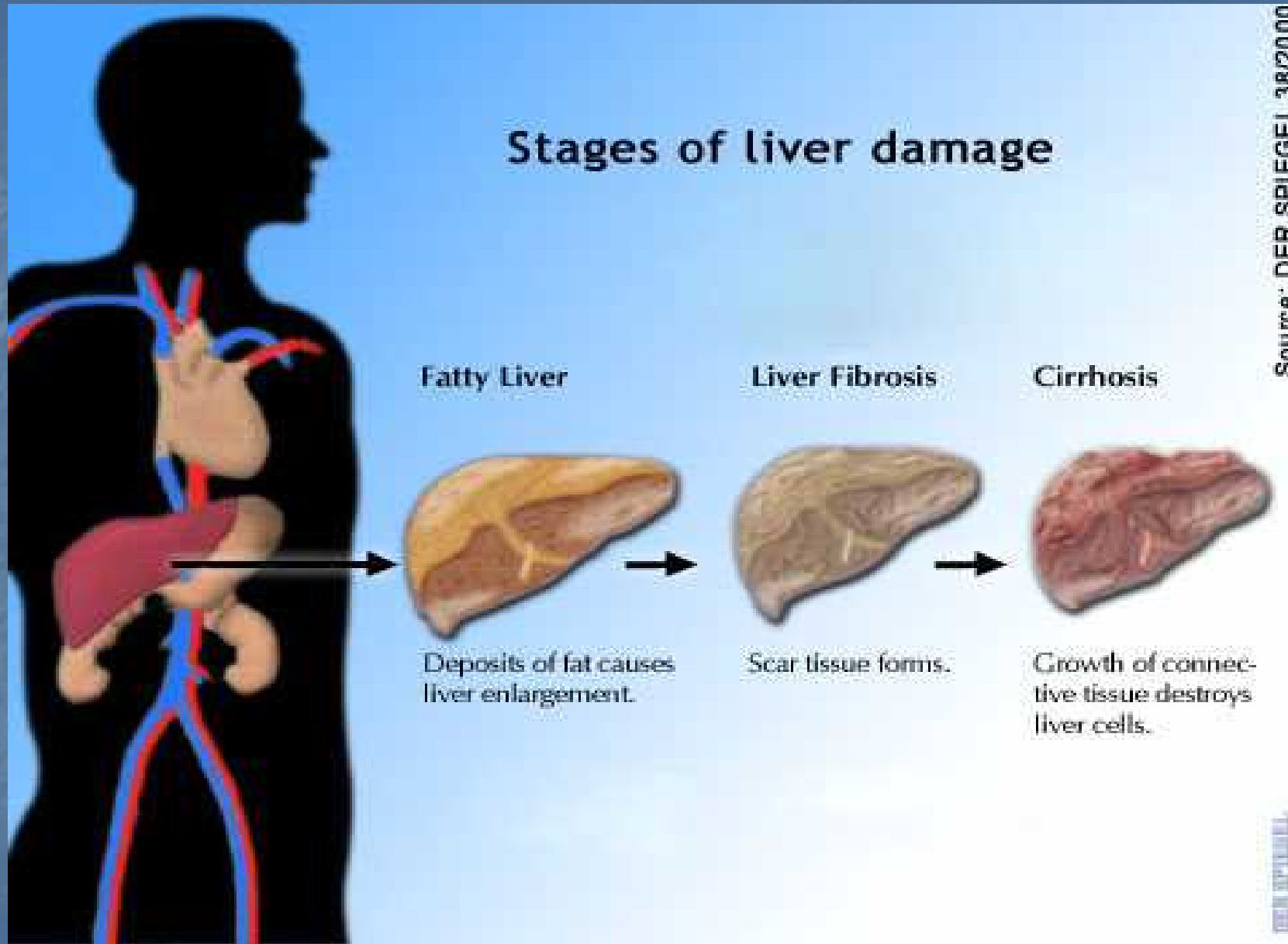
Healthy liver



Cirrhosis



Stages of liver damage



Progression
of alcoholic liver
disease
in heavy drinkers.

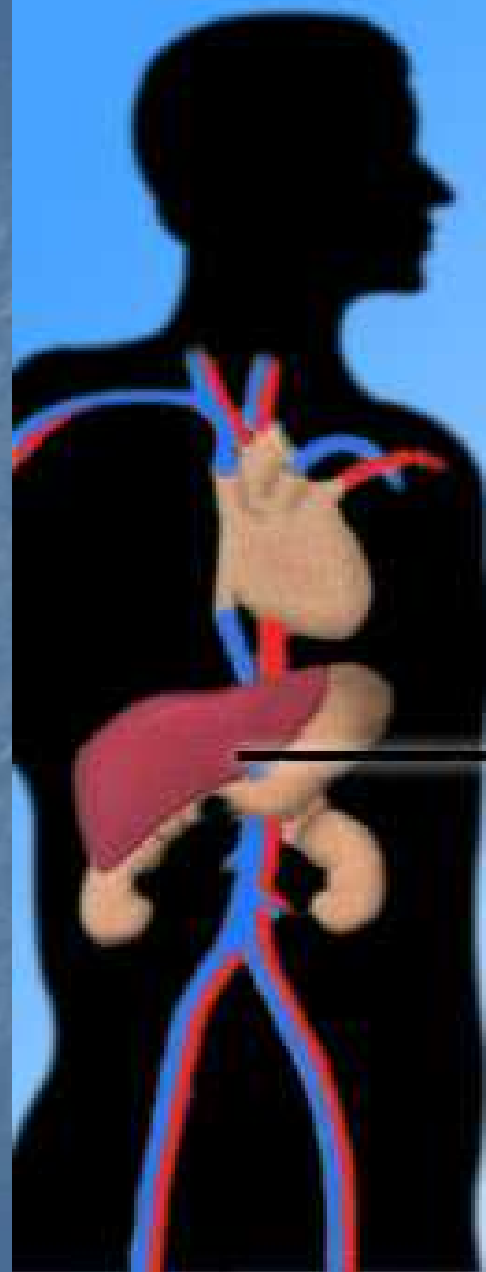


Healthy

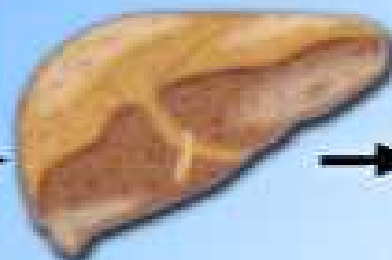


Cirrhosis

The price you pay stages of alcohol-induced liver damage



Fatty Liver



Deposits of fat causes liver enlargement.

Strict abstinence can lead to a full recovery.

Liver Fibrosis



Scar tissue forms.

Recovery is possible, but scar tissue remains.

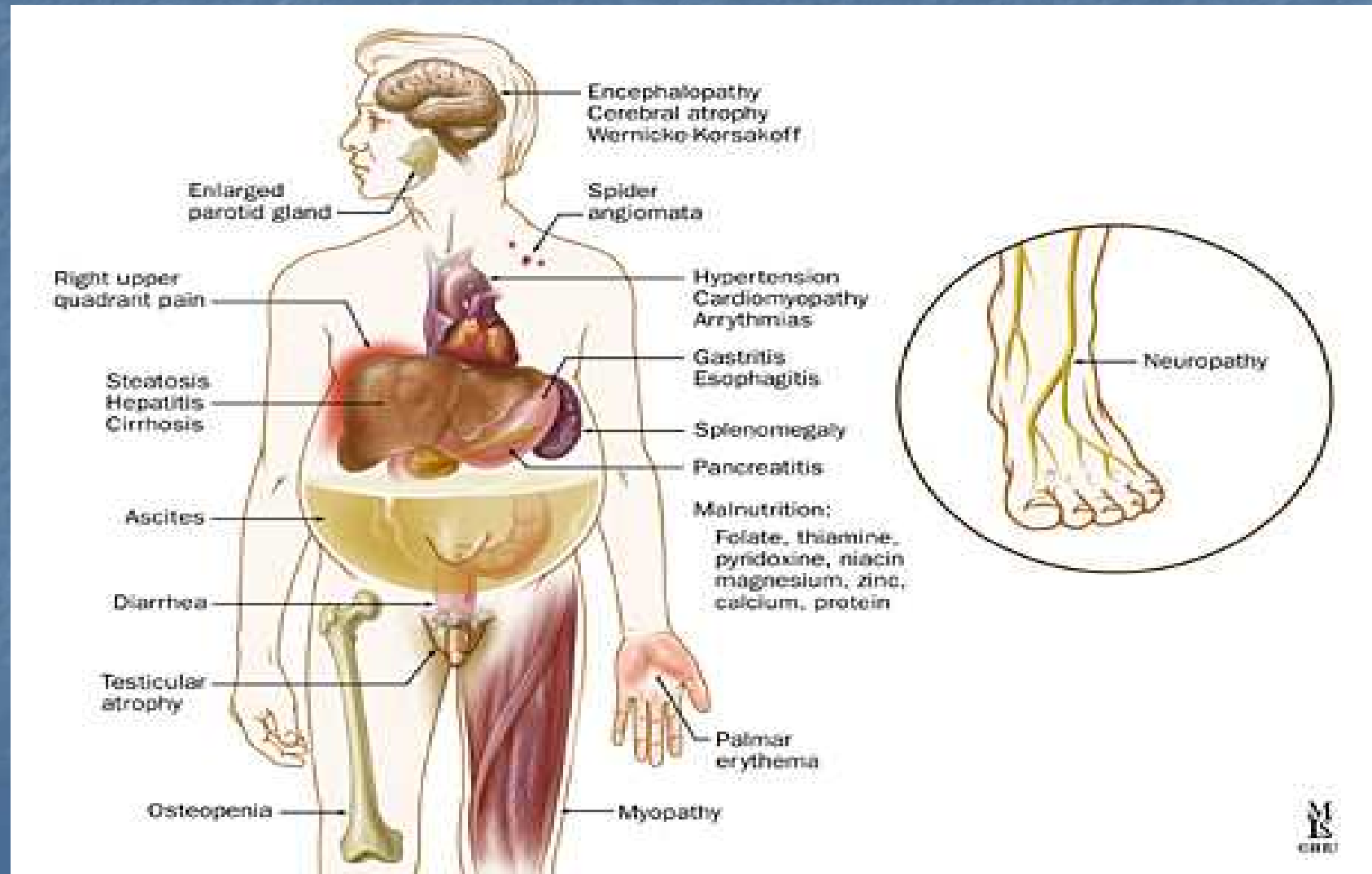
Cirrhosis



Growth of connective tissue destroys liver cells.

The damage is irreversible.

Signs and symptoms of Alcohol-related Liver disease



Damage to liver tissue results in:

- scarring of the liver (fibrosis; nodular formation)
- progressive decrease in liver function, excessive fluid in the abdomen (ascites)
- bleeding disorders (coagulopathy)
- increased pressure in the blood vessels (portal hypertension)
- and brain function disorders (hepatic encephalopathy).

Cirrhosis of the liver



Scarring

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Coagulopathy
Bleeding Disorder

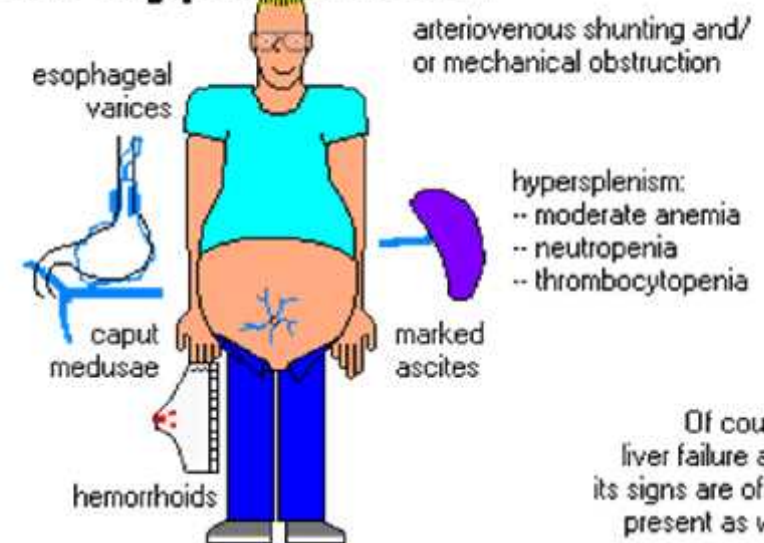


Ascites

Increased amount of fluid
between abdominal structures



Portal Hypertension



Of course,
liver failure and
its signs are often
present as well.

Cirrhosis:

Signs & Symptoms

- ❖ Weakness, fatigue
- ❖ Weight loss, anorexia, nausea, diarrhea
- ❖ Abdominal pain, sterility, loss of libido, impotence
- ❖ Hematemesis
- ❖ Urine may be dark (urobilinogen)
- ❖ Stools may be pale or grey (lack of bilirubin)

Physical Assessment

- ❖ Jaundice
- ❖ Hepatomegaly
- ❖ Ascites
- ❖ Pleural effusion
- ❖ Spider angiomas, spider nevi
- ❖ Asterixis (advanced)
- ❖ Personality or behavioral changes



Figure 19-12 Asterixis (or "flap") is a sign of advanced liver disease. The patient is asked to hold the index finger straight out and then to flex the wrist. Asterixis is the resulting flapping motion of the hand.

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Spider Nevi



Vascular abnormalities, spider naevus (or spider telangiectasia) are common, and occur in more than half of the clients. In this picture, another feature of the cirrhosis is also seen, the skin is icteric (jaundiced).

Cirrhosis

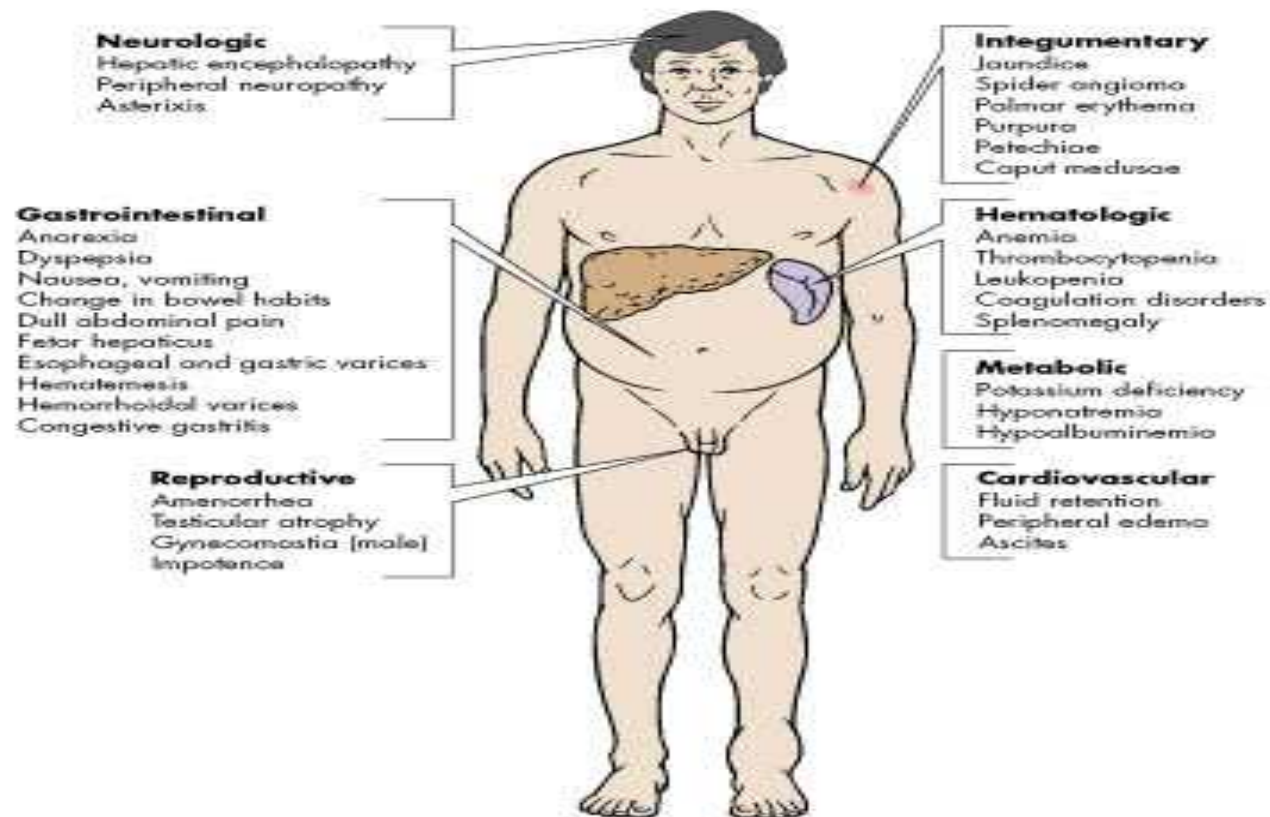


Figure 41-5 Systemic clinical manifestations of liver cirrhosis.

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What diagnostic tests would be done in a client with Cirrhosis?

Diagnostic tests

- CBC, electrolytes, BUN, Bilirubin levels
- LFTs (AST, SGOT, SGPT, ALT)
- Albumin levels, Ammonia levels
- Coagulation tests
- Urinalysis
- Liver biopsy
- Barium swallow
- CT scan, liver scan
- EEG

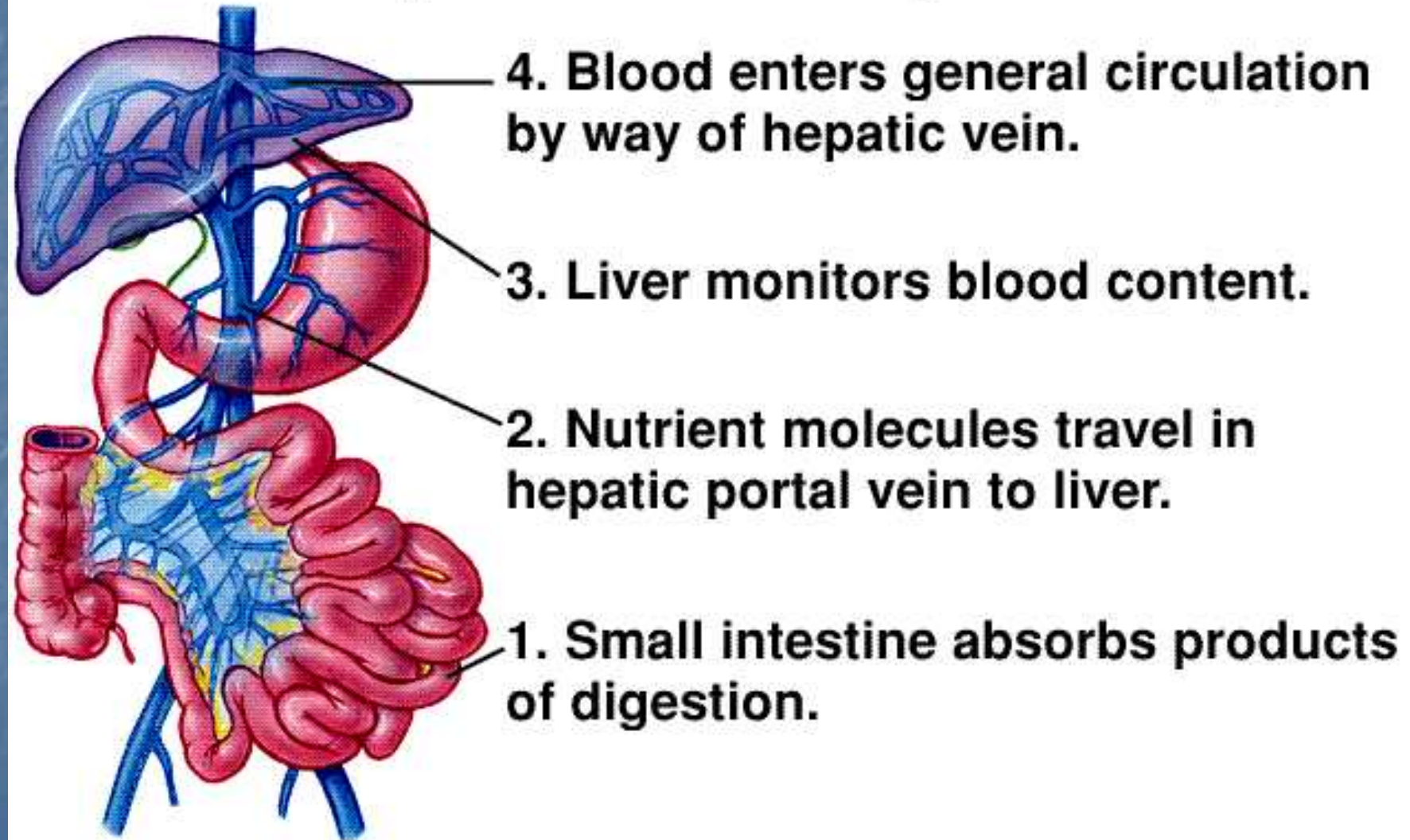
Collaborative Management

- Monitor for complications: esophageal varices, hepatic encephalopathy, renal failure, infection
- Maximize liver function with diet
- Treat underlying cause
- Prevent infection

Nursing Diagnosis

- Imbalanced nutrition: less than body requirements
- Impaired skin integrity
- Ineffective breathing pattern
- Risk for injury
- Risk for infection
- PC: hepatic encephalopathy
- PC: hemorrhage

Hepatic Portal System



Portal Circulation

- **Portal Circulation:** Blood from the gut (GI Tract) and spleen flow to and through the liver through portal vein before returning to the right side of the heart.
- After passing through the liver, blood flows into the hepatic vein, which leads into the inferior vena cava to the right side of the heart.
- The liver also receives some blood directly from the heart via the hepatic artery.
- In the esophagus, stomach, small intestine and rectum, the portal circulation and veins of the systemic circulation are connected. Under normal conditions, there is little to no back flow from the portal circulation into the systemic circulation. So what do nurses assess for?

Portal hypertension:

- **Decreased** blood flow to the liver and blood back up in the portal vein and portal circulation leads to some of the serious complications of cirrhosis. Blood can back up causing an enlarged spleen and sequester (increase breakdown) blood cells. Most often, the platelet count falls because of splenic sequestration leading to abnormal bleeding.
- If the pressure in the portal circulation **increases** (because of cirrhosis and blood back up) blood can flow backwards from the portal circulation to the systemic circulation where they are connected.

Portal hypertension can lead to:

- **Varicose veins** in the stomach and esophagus (gastric and esophageal varices) and rectum (hemorrhoids).
- Gastric and esophageal varices can rupture, bleed massively and even cause death.
- Portal hypertension along with other hormonal, metabolic and kidney abnormalities in cirrhosis, can also lead to fluid accumulation in the abdomen (**ascites**) and the peripheral tissue (peripheral edema).

Ascites:

Ascites results from several factors:

- Increased capillary pressure and the obstruction of venous flow through the liver.
- The liver cannot metabolize aldosterone so there is an increase in sodium and water retention by the kidneys
- Decreased synthesis of albumin by the liver.

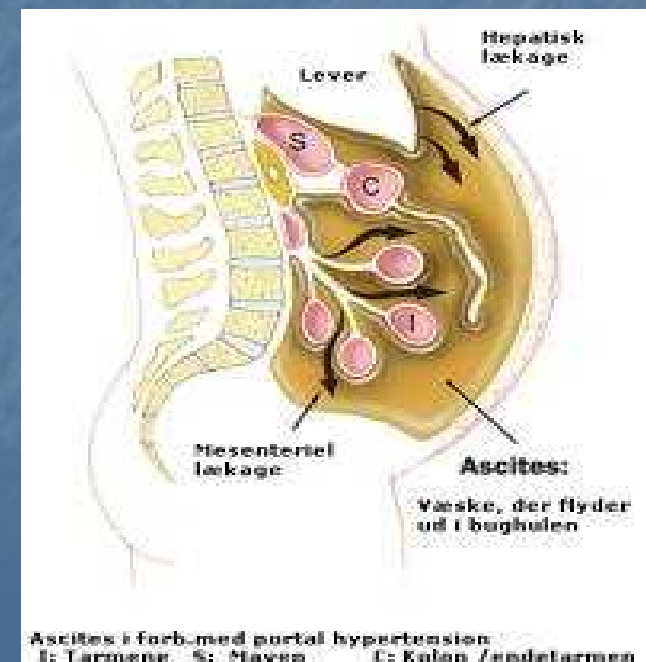
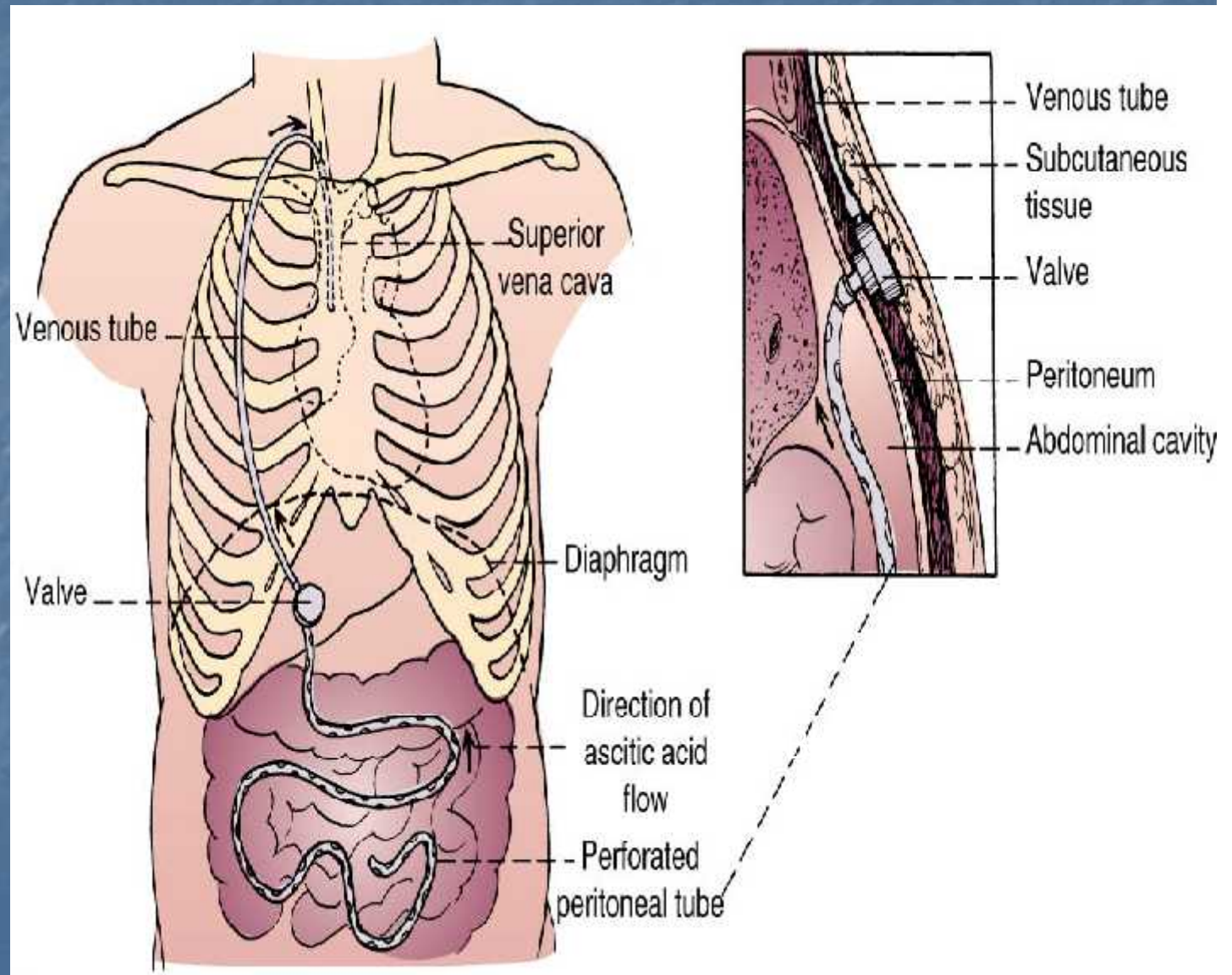


Figure 47-6 : LeVeen Peritoneovenous Shunt

Provides continuous reinfusion of ascitic fluid into the venous system



Paracentesis

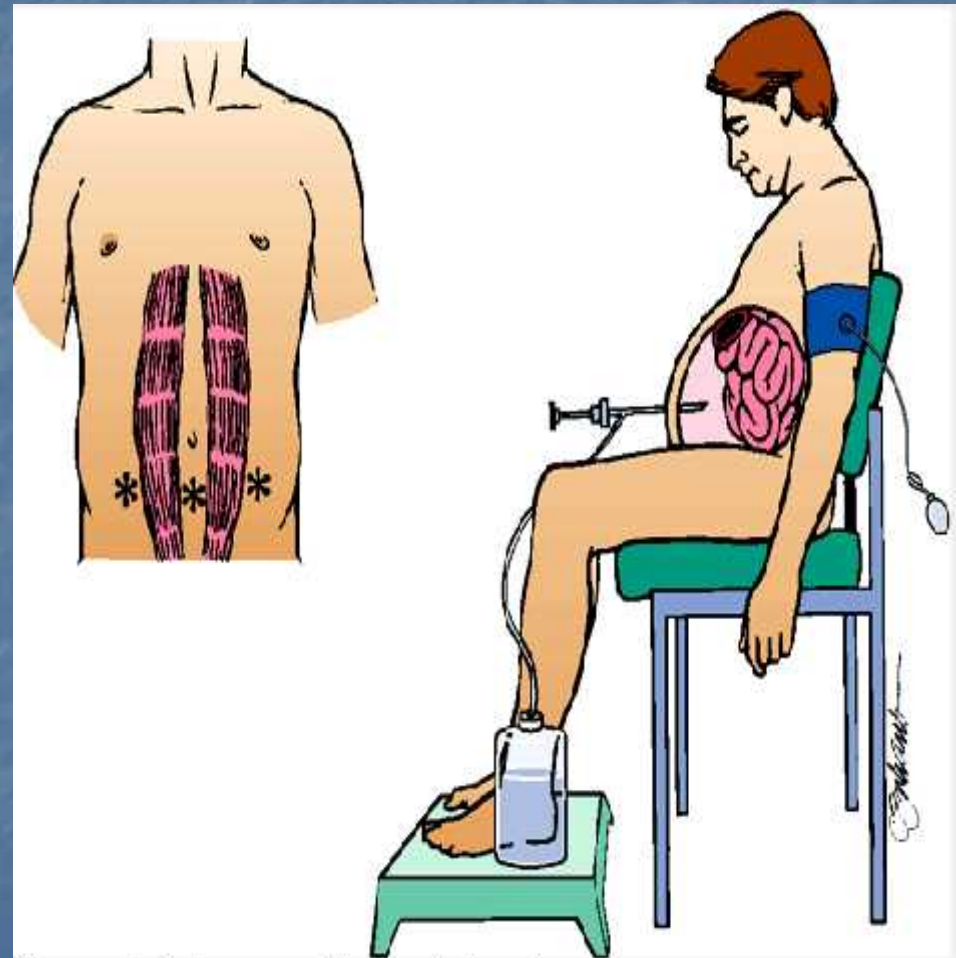
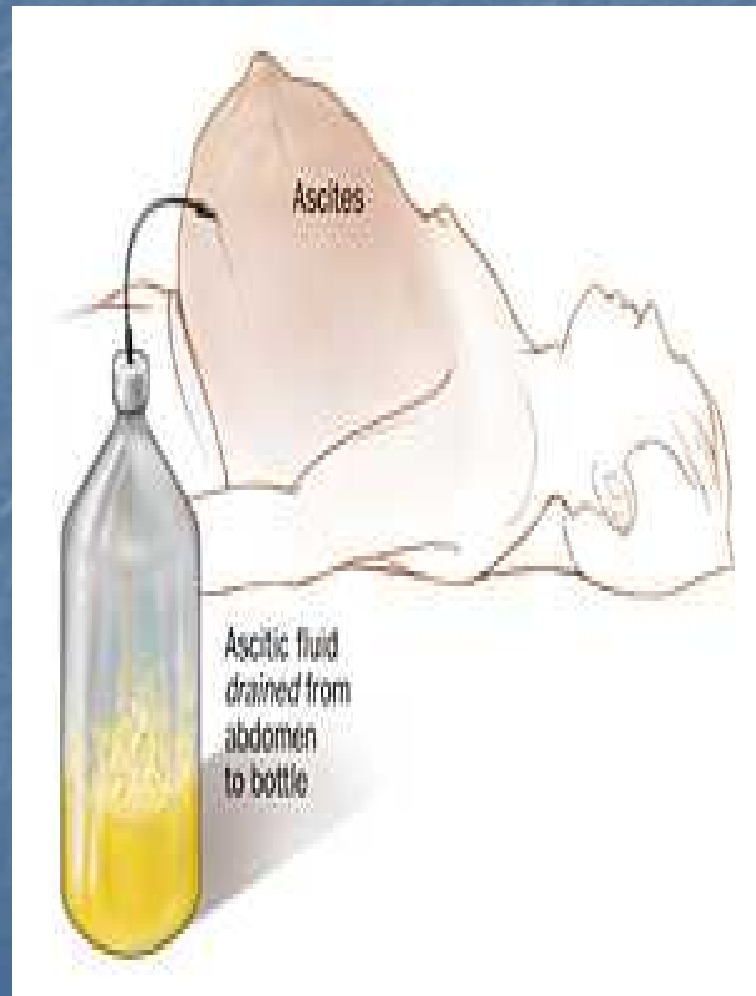
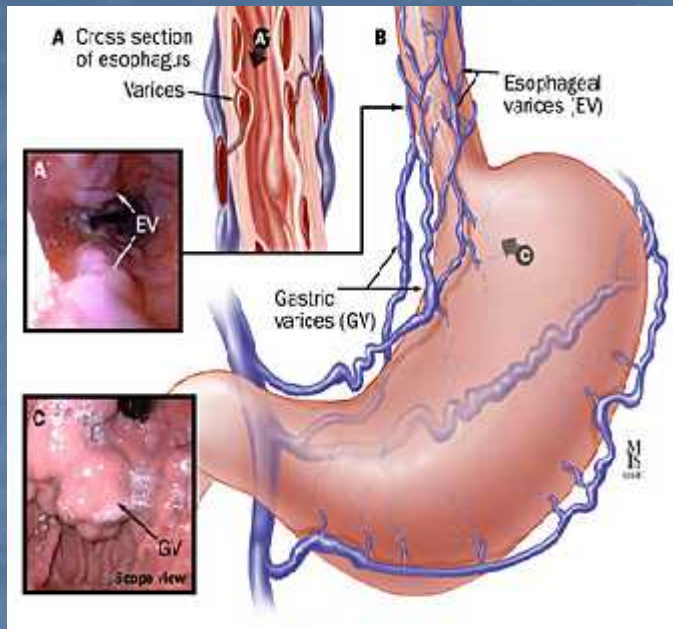


Figure on left shows possible sites for insertion of trocar.

Esophageal Varices



- Esophageal varices are a common - and dangerous – complication of alcoholic cirrhosis, and bleeding from the varices is a medical emergency.

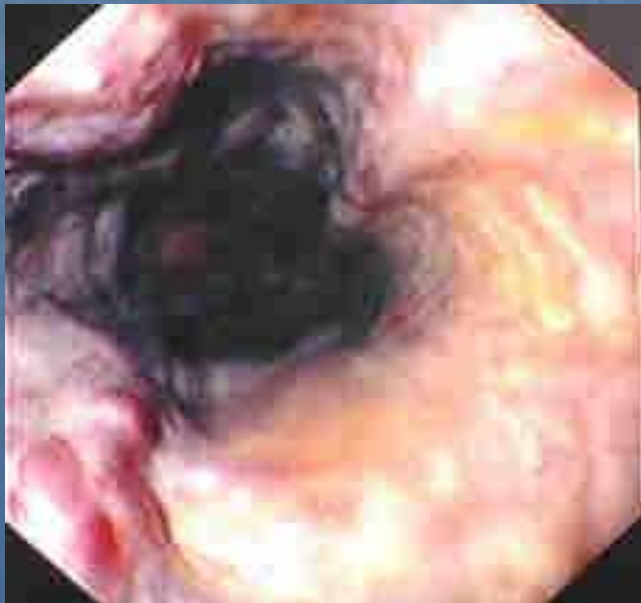
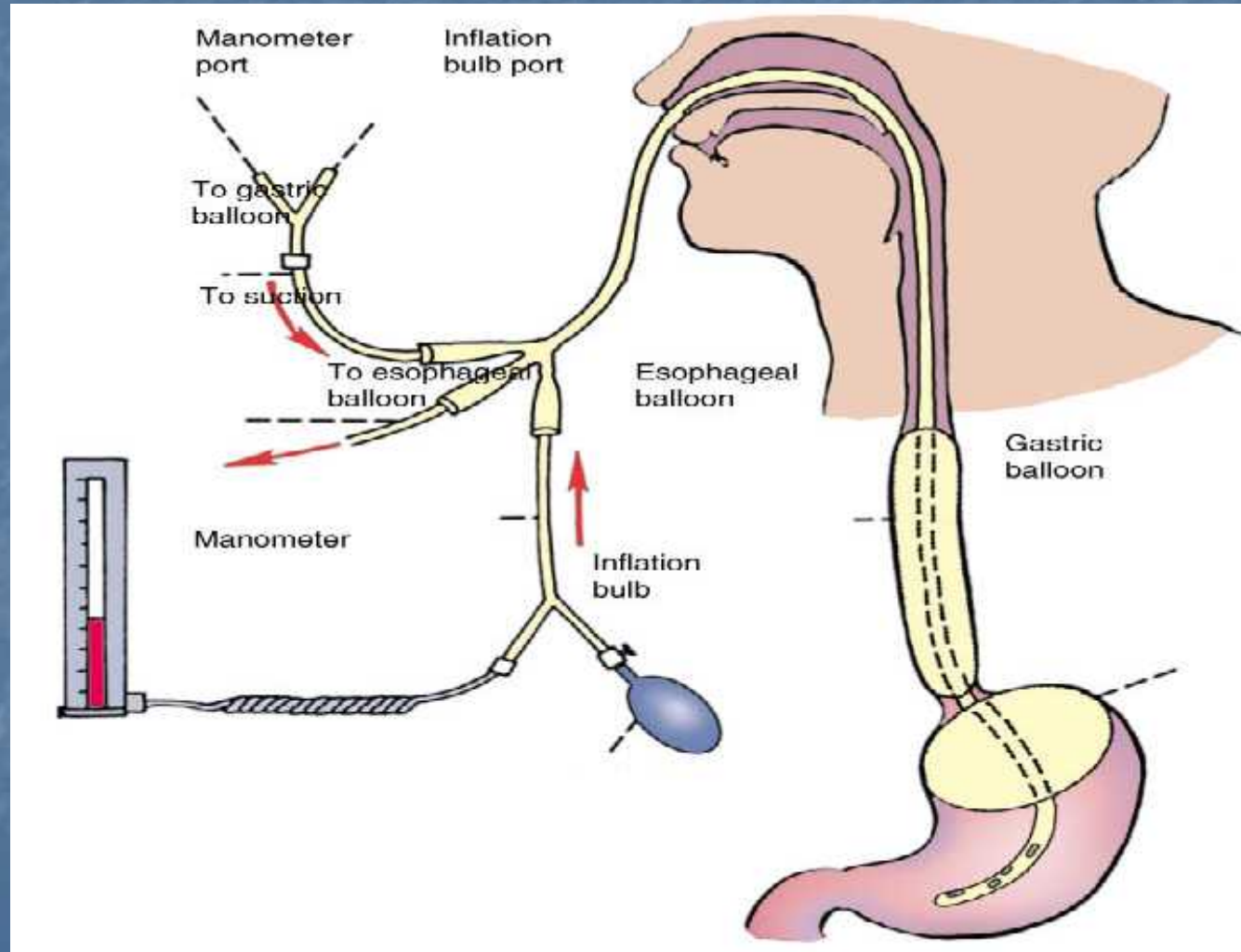


Figure 47-3: Sengstaken-Blakemore Tube Used to Control Ruptured Esophageal Varices

Balloon tamponade of varices



Sengstaken-Blakemore Tube Used to Control Ruptured Esophageal Varices

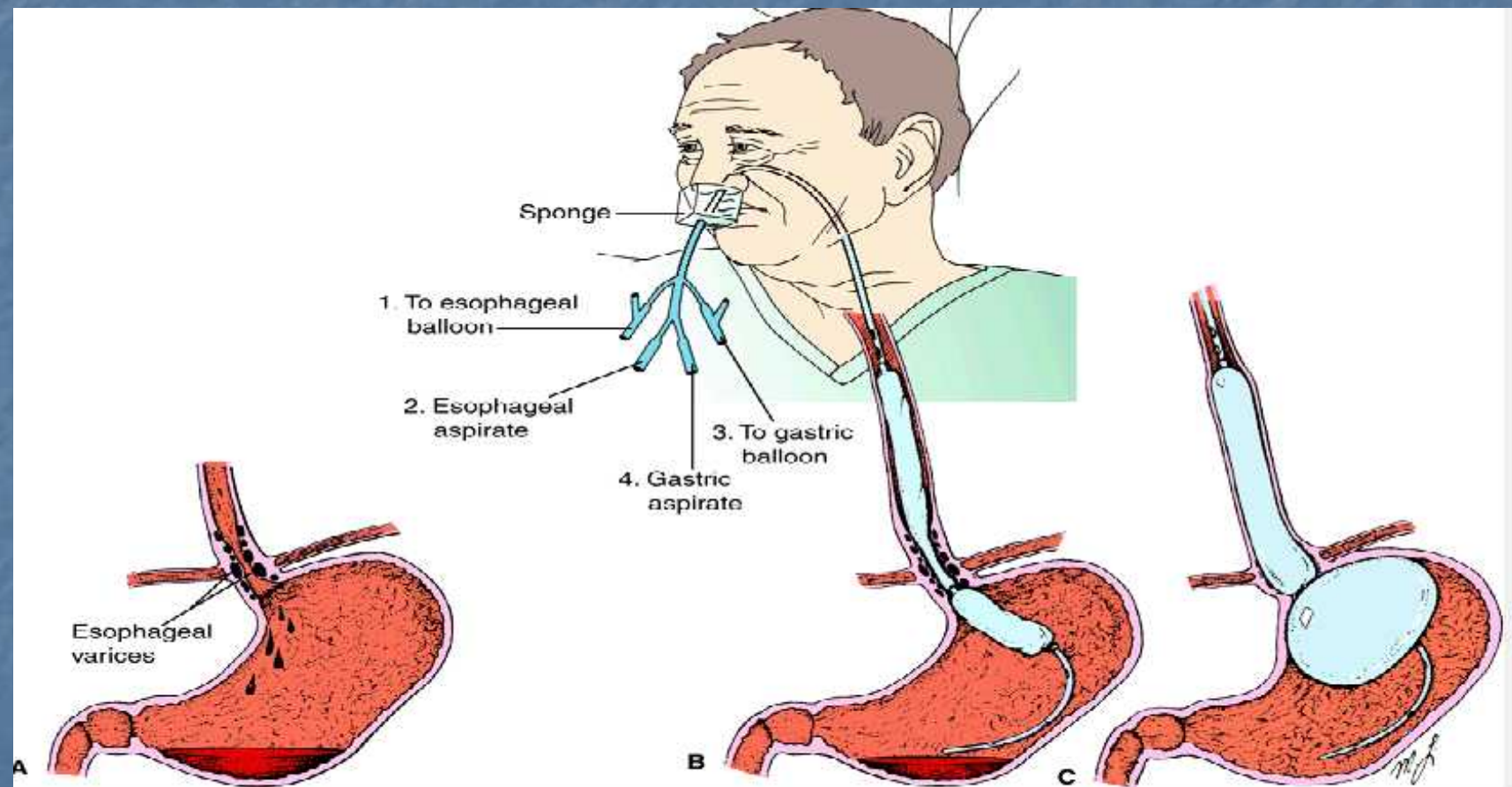


Figure 39 7 Esophageal balloon tamponade to treat esophageal varices. (A) Dilated, bleeding esophageal veins (varices) of the lower esophagus. (B) A four-lumen esophageal tamponade tube with balloons (uninflated) in place. (C) Compression of bleeding esophageal varices by inflated esophageal and gastric balloons. The gastric and esophageal outlets permit the nurse to aspirate secretions.

Hepatic Encephalopathy

- **Hepatic Coma** : impaired CNS function resulting from liver disease.
- The liver is unable to de-toxify the blood resulting in increased ammonia (CNS toxin) accumulation.
- Any process that leads to increased protein in the intestine causes elevated ammonia
- Read text for medical and nursing management

Hepatic Encephalopathy

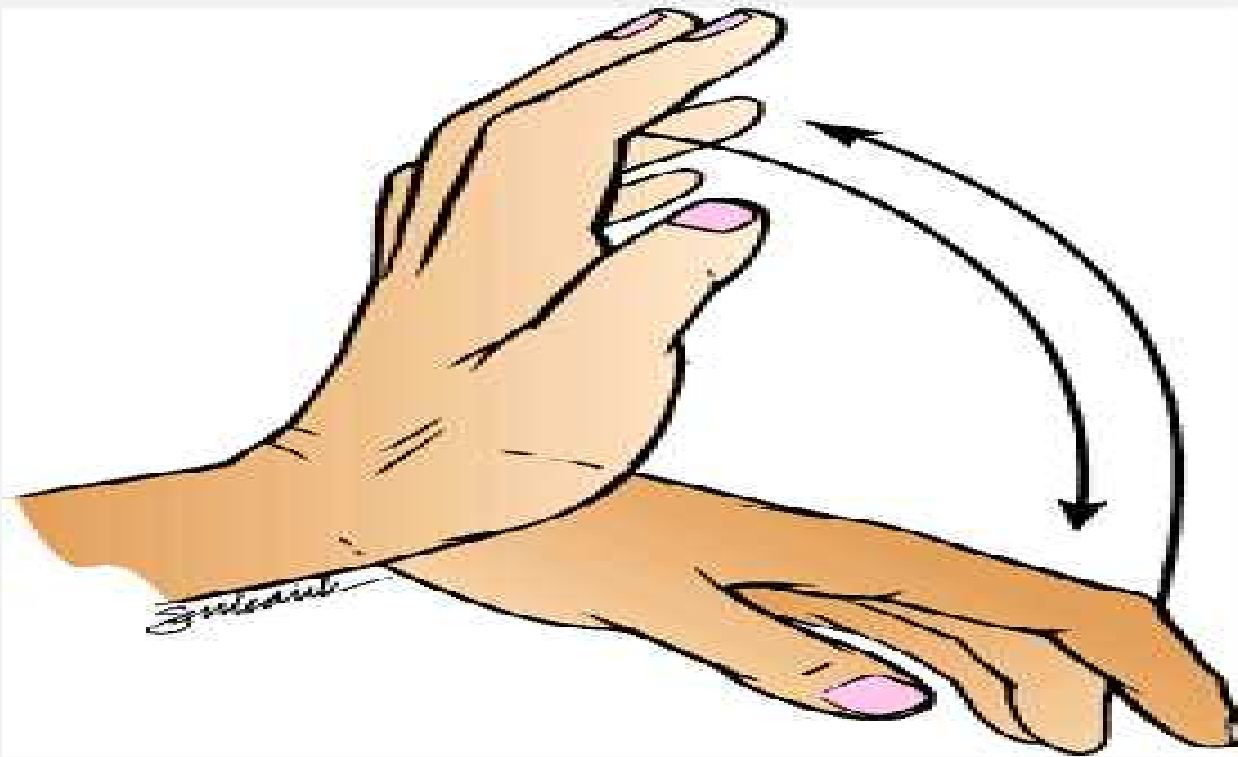


Figure 39-12 Asterixis or “liver flap” may occur in hepatic encephalopathy. The patient is asked to hold the arm out with the hand held upward (dorsiflexed). Within a few seconds, the hand falls forward involuntarily and then quickly returns to the dorsiflexed position.

Liver Cirrhosis

Be sure to understand!

- Know what cirrhosis is & what causes it
- Note common assessment findings
- Consider ways that nurses can help clients through support, comfort measures, & teaching
- How can a nurse help a person who is itchy?
- What is a Sengstaken Blackmore tube for?
What are the risks?
- How would you explain what jaundice is?

cont

- What is portal hypertension?
- What causes ascites and what are the complications?
- What is the medical management of ascites?
- What are esophageal varices?
- What is a Le Veen peritoneovenous shunt for?
- What dietary modifications are made for persons with liver disease? & Why?

If you were caring for a client with cirrhosis..

- Daily weight - same what?
- Fluid & electrolyte comparisons
- Assess dependent edema- Where?
- Assess stool & urine & vomit for what?
- Assess for internal bleeding - How?
- Dependent areas exercised - Why & how?
- How can pruritis associated skin breakdown be averted?
- Why no constipation, sneezing, hard toothbrushes and straight razor
- Why check on OTC meds?
- Why no alcohol?
- What drugs will likely be used?

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