



College of Nursing
UNIVERSITY OF THE PHILIPPINES MANILA
The Health Sciences Center

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Liver Cirrhosis

Function of the liver

- Liver has a lot of function but it mainly
 - filters the blood (removing toxins from the body's blood supply)
 - maintains healthy blood sugar levels
 - regulates blood clotting
- **Cirrhosis**
 - Scarring (fibrosis) of the liver caused by long-term liver damage. The scar tissue prevents the liver working properly → replaces healthy liver tissue, leading to impaired liver function
 - end state of **chronic** liver disease, progressive and irreversible
 - DISH = Degeneration, Inflammation, Scarring, Hardening
 - **Risk factors:**
 1. long-term liver damage from conditions such as chronic alcoholism, viral hepatitis (such as hepatitis B or hepatitis C), fatty liver disease, or autoimmune liver diseases.
- **Types/Causes of Cirrhosis**
 - **Laennec's** → Alcoholism/malnutrition
 - Laënnec, or portal, cirrhosis is primarily caused by excessive and chronic alcohol consumption.
 - **Post-necrotic** → Post HepB



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- Post-necrotic cirrhosis means the liver is scarred and has nodules or growths of more than 3 mm in diameter
- Most dangerous
- Occurs after an attack of Hepatitis B
- **Biliary** → Biliary obstruction
 - When the bile ducts in the liver become swollen or inflamed, this blocks the flow of bile. These changes can lead to scarring of the liver called cirrhosis
- **Cardiac** → due to right sided heart failure
 - is a term used to include the spectrum of hepatic disorders that occur secondary to hepatic congestion due to cardiac dysfunction, especially the right heart chambers

Pathophysiology:

- Fibrosis and nodule formation of the liver s/t chronic injury (healthy cells are replaced by scar tissue) → increased intrahepatic resistance to portal blood flow → increased pressure in the vein that brings blood to the liver (portal hypertension)

Laboratory and Diagnostics

- Cirrhosis can be diagnosed by radiology testing such as
 - **Computed tomography (CT)**
 - Performed to assess the liver and their related structures for tumors, lesions, bleeding
 - If w/o contrast, pt can eat, drink, and take medications
 - Encouraged to drink clear liquids
 - If w/ contrast, NPO 3 hours prior to CT scan
 - **Ultrasound**
 - No special preparation
 - Does not require fasting but may be required in liver ultrasound 8-12 hours before the procedure
 - **Magnetic resonance imaging (MRI)**
 - **Needle biopsy of the liver**

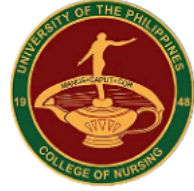
Advanced cirrhosis

- life threatening condition with risk of “**decompensation**”, where the liver is incapable of performing all of its normal functions.
 - represents the final stages of chronic liver disease, characterized by severe scarring and a significant loss of liver function



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- **Manifestations** (same manifestations above except necrosis)
 - *Swelling* – decreased albumin synthesis → increased pressure in the portal vein → accumulation of fluid in the legs and abdomen
 - *Scarring* – liver tries to repair the damage → formation of scar tissues
 - *Necrosis* – d/t reduced blood flow to the liver
 - Inflammation – *refer to systemic inflammation*

Complications

- **Portal hypertension** - the portal vein carries blood to the liver. Scar tissue in liver cirrhosis causes blood vessels to compress and reduces the blood flow. The blocked flow causes an increase in pressure which leads to portal hypertension.
- **Splenomegaly** - reduced blood flow through spleen due to portal - due to the blockage of blood flow to the liver and the increase in portal hypertension, blood backs up and accumulates in the spleen which causes its enlargement. HTN causing it to swell with excess blood and to create new blood vessels to accommodate the blood flow
- **Ascites** - pathological fluid accumulation in the peritoneal cavity causing overt abdominal distention
- **Esophageal varices** - the scarring cuts down on blood flowing through the liver. As a result, more blood flows through the veins of the esophagus, and the extra blood flow causes the veins in the esophagus to balloon outward.
- **Hepatic encephalopathy** - Since the liver is unable to function properly and its filtering capacity decreases, there is an accumulation of toxins such as ammonia and manganese in the blood. When this enters the brain, the nerve cells are damaged.
- **Hepatorenal syndrome** - It is a multiorgan condition affecting the kidneys and the liver as cirrhosis and portal hypertension triggers the neurohormonal cascade.

Liver Cirrhosis: Systemic Effects

- Liver cirrhosis, being a chronic and progressive condition, affects not just the liver but has widespread systemic effects that can impact various organ systems.
 - a. **Neurologic:**
 - *Hepatic Encephalopathy*: Impaired liver function leads to the accumulation of toxins, such as ammonia, in the bloodstream, which can affect brain function, causing symptoms ranging from mild confusion and forgetfulness to coma.
 - *Peripheral Neuropathy*: Less common, but cirrhosis can lead to nerve damage outside the brain and spinal cord, causing weakness, numbness, and pain, typically in the hands and feet
 - b. **Gastrointestinal:**



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- *Portal Hypertension*: Increased pressure in the portal vein can lead to the development of varices, which are enlarged veins in the esophagus, stomach, or rectum. Varices can rupture, causing life-threatening bleeding.
- *Hepatomegaly*- d/t inflammation, fatty infiltration, or as an initial compensatory mechanism to overcome increased resistance within the liver due to fibrosis.
- *Ascites*: Accumulation of fluid in the abdominal cavity due to portal hypertension and hypoalbuminemia

c. Reproductive:

- *Gynecomastia* (overdevelopment or enlargement of the breast tissue in men) - d/t increased SHBG (sex hormone binding globulin) that binds testosterone more avidly than estrogen
- *Hypogonadism*: Reduced production of sex hormones can lead to decreased libido, erectile dysfunction, and infertility.

d. Integumentary:

- *Jaundice*: Buildup of bilirubin in the bloodstream can cause yellowing of the skin and eyes.
- *Spider Angiomas*: Spider-like blood vessels on the skin, often seen on the face, neck, and upper trunk, due to altered estrogen metabolism.

e. Hematologic:

- *Thrombocytopenia*: Reduced platelet count **due to splenic sequestration and decreased production in the bone marrow, leading to an increased risk of bleeding.**
- *Anemia*: decreased production of red blood cells and increased destruction due to hypersplenism or bleeding from varices.

f. Metabolic:

- ***Weight loss***- d/t malabsorption of nutrients from the impaired liver function, and increased metabolic demand.
- ***Anorexia***- d/t reduction in bile production, affecting digestion and leading to a decrease in appetite.
- *Hypokalemia*: Cirrhotic patients may develop respiratory alkalosis due to hepatic dysfunction and portal hypertension. Alkalosis enhances the shift of potassium into cells, lowering serum potassium levels.
- *Hypoalbuminemia*: Reduced synthesis of albumin by the liver can lead to edema and ascites due to decreased oncotic pressure in the bloodstream.
- *Hyponatremia*: Portal hypertension leads to the activation of the RAAS and increased secretion of antidiuretic hormone (ADH or vasopressin). This results in enhanced renal sodium and water retention, leading to dilutional hyponatremia.

g. Cardiovascular:



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- *Cirrhotic Cardiomyopathy*: Changes in heart function, including impaired contractility and relaxation, due to alterations in cardiac structure and function caused by the condition.
- *Fluid Retention*: Cirrhosis can lead to volume overload, exacerbating cardiovascular conditions such as hypertension and heart failure.
- *Tenderness over RUQ*- d/t distension of the liver capsule, leading to discomfort or pain.

Nursing Diagnoses

- Imbalanced nutrition: less than body requirements
 - Liver Cirrhosis affects food absorption and decrease production of proteins and vitamins that which may contribute to malnutrition
 - Abdominal pain can cause discomfort that may decrease appetite
- Excess fluid volume
 - Fluid accumulation in the abdomen and legs
- Impaired skin integrity
 - Compromised skin integrity from fluid build-up, accumulation of bile salts and bleeding
- Dysfunctional family processes
 - Alcoholism?
- PC: Hemorrhage
 - Esophageal varices: when the walls of the enlarged veins become thinner, they are more prone to rupture and bleed.
- PC: Hepatic encephalopathy
 - The liver filters toxins from the blood. When you have liver disease, ammonia and other toxins can build up in the brain, causing decline in brain function.

Collaborative Care

- a. Ascites - The following interventions are done to avoid sodium retention and water overload.
 - sodium restriction
 - Diuretics
 - fluid removal (paracentesis, peritoneovenous shunt)
 - Paracentesis - a medical procedure used to remove fluid from the abdominal cavity for diagnostic or therapeutic purposes.
 - Peritoneovenous shunt - a shunt which drains peritoneal fluid from the peritoneum into veins, usually the internal jugular vein or the superior vena cava. It is sometimes used in patients with refractory ascites.
- b. Esophageal & gastric varices
 - avoid alcohol, ASA (acetylsalicylic acid), NSAIDs



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- can exacerbate liver damage and increase the risk of bleeding
 - controlled coughing
 - can increase intra-abdominal pressure, which may exacerbate the pressure within the varices and potentially lead to their rupture.
 - prompt treatment of URTI
 - Infections can lead to increased coughing which may increase intra-abdominal pressure
 - Stabilization of airway
 - BT
- c. **Esophageal & gastric varices (Treatment)**- enlarged veins in the esophagus. They're often due to blocked blood flow through the portal vein.
- **Pharmacologic**
 - Somatostatin- effectively reduces hepatic blood flow and portal pressure
 - Vasopressin- to address hyponatremia due to sodium retention and a decreased free water clearance
 - Propranolol- lower portal pressure and inhibit renin secretion, lessen tendency for ascites
 - Vitamin K- for Vit. K deficiency due to Malabsorption, also for clotting
 - H2-receptor blockers- reduces gastric acid secretion
 - **Procedures**
 - **Sclerotherapy**- minimally invasive treatment for varicose veins and spider veins and address bleeding
 - No aspirin or blood-thinning products week before the procedure
 - use of compression stockings after procedure
 - Pain meds may be used after for crampings
 - Ambulation
 - **Rubber Band Ligation (RBL)**- hemorrhoids are tied to cut blood flow and stop bleeding (due to portal hypertension)
 - Hold anticoagulant medications
 - Pain meds after the surgery
 - Sitz bath comfort promotion
 - **Balloon tamponade**- used to achieve temporary hemostasis of bleeding esophagogastric varices and as a bridge to definitive therapy
 - **Sengstaken-Blakemore Tube**- stop bleeding in stomach or esophagus
 - **Minnesota**- Quadruple lumen has an additional suction tip for aspirating
 - **Linton- Nachlas tube**- Triple-lumen design permits suctioning of esophageal fluids above the balloon and gastric fluids below the balloon to quickly determine origin of bleeding.



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- Positioning upright, elevated at 45 deg or left side-lying to avoid aspiration of blood
- Ensure patent airway before the procedure and level of consciousness of the patient.
- Monitor vital signs including saturation and blood pressure.
- NPO
- **Transjugular intrahepatic portosystemic shunt (TIPS)**- a procedure that uses imaging guidance to create a connection between two large veins in the liver, the portal vein and the hepatic vein. This helps blood bypass the abnormal liver so that it can return to the heart more easily.
 - Pre-procedure
 - Monitor Liver enzymes, CBC, Imaging studies
 - Post- procedure
 - Place the patient on bedrest for 4 hours with the head of the bed elevated 30 to 45 degrees.
 - Monitor vital signs, mental status, and access site (for bleeding or hematoma) every 15 minutes for the first hour, every 30 minutes for 2 hours, then hourly for 2 hours.
 - Perform strict intake and output, as well as daily patient weight.
 - Monitor lab tests (complete blood count, coagulation panel, and liver and kidney function test)
 - Monitor for signs of gastric bleeding.
 - Monitor for signs of encephalopathy.
 - Measure abdominal circumference.
 - Restrict fluid and protein intake.
- **Hepatic Encephalopathy**
 - A condition characterized by brain dysfunction caused by liver disease.
 - It occurs when the liver is unable to effectively remove toxins from the blood, allowing them to accumulate and affect brain function.
 - **May affectation na sa brain function due to the accumulation of ammonia sa blood.**
 - NVS - Neuro VS (temp, bp, rr, pr)
 - Pharmacologic (lactulose, neomycin, metronidazole, vancomycin, enemas) - basically to manage/reduce the presence of ammonia in the blood
 - **Lactulose: reduce the intestinal production/absorption of ammonia** by several mechanisms: Colonic breakdown of lactulose to lactic acid leads to acidification of the gut which favors the formation of nonabsorbable



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NH₄⁺ from NH₃, thereby trapping NH₄⁺ in the colon and reducing plasma ammonia concentrations.

- **Neomycin**: an **antibiotic that is sometimes used in combination with other therapies to reduce the production of ammonia-producing bacteria in the stomach**. It is used to treat and manage hepatic coma and perioperative prophylaxis. Neomycin belongs to the aminoglycosides group of antibiotics, which functions by inhibiting bacterial protein synthesis, resulting in a bactericidal effect primarily against gram-negative bacteria.
- **Metronidazole**: an effective drug for the treatment of various abscesses caused by infection with anaerobic bacteria and hepatic encephalopathy not controlled by **administration of lactulose**. **It works by reducing the population of ammonia-producing bacteria in the gut**, thereby decreasing the production of ammonia in the colon
- Vancomycin: Antibiotic
- Enemas

- **Nutrition**

- High calories (without complications)
- Protein restriction (ONLY during severe flare of S/Sx)
- High CHO, adequate CHON, moderate to low fats
- Low sodium (esp. ascites & edema)
- *Since the liver could not store glycogen anymore due to cirrhosis, high calories and protein are needed to meet the body's energy demands.*