Complications of Liver Cirrhosis

1. Portal Hypertension
2. Ascites
3. Splenomegaly
4. Jaundice
5. Cholestasis
6. Hepatorenal Syndrome
7. Esophageal Varcies

Made by:

Pathology Team:

Roa Al-Sajjan

Norah Al-Saif

Nourhan Al-Shamma'

Dona Barakah

Muhammad Al-Harbi

1. Portal Hypertension

Resistance to blood flow in the venous portal system

- Causes:
  - **Prehepatic** e.g. portal vein thrombosis, external compression by tumor
  - **Intrahepatic**: obstruction of blood flow within the liver e.g. cirrhosis; fibrous tissue & nodules distort the liver's architecture
  - **Posthepatic**: obstruction of blood flow through the hepatic veins e.g. hepatic veins thrombosis, severe right-sided heart failure (blood cannot be returned to heart → obstructed hepatic veins), *Budd-Chiari syndrome*

2. Ascites

↑ Fluid in the peritoneal cavity

- Serous fluid; contains less than 3 g/dL of protein (mostly albumin)
- Causes: Liver cirrhosis (85% of cases) & portal hypertension
- Mechanisms:
  - ↑ capillary pressure & impaired portal venous flow through the liver (sinusoidal hypertension)
  - ↓ osmotic colloidal pressure because of impaired albumin synthesis by the liver (hypoalbuminemia)
  - Leakage of hepatic lymph
  - Salt & water retention by the kidney (secondary hyperaldosteronism; because of impaired aldosterone metabolism by the liver)
- Complications: *Spontaneous bacterial peritonitis* (bacteria from blood, lymph or bowel wall)

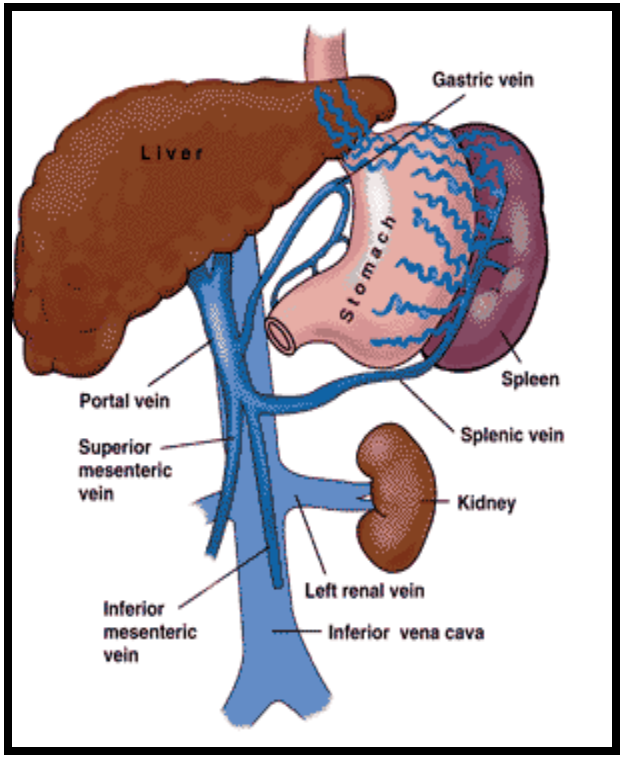
Fluid would contain neutrophils and 1 g/dL or less of protein

Symptoms: fever & abdominal pain.
Maybe: diarrhea, hypothermia & shock

3. Splenomegaly

- Massive splenomegaly = spleen weighs > 1000 g because of long-standing congestion

  The spleen enlarges progressively in portal hypertension because of shunting of blood into the splenic vein



- Hypersplenism: enlarged spleen → sequestering (isolating, hiding away) of blood elements
  → ↓ in life span of blood elements
  → ↓ in their numbers
  = anemia, thrombocytopenia, leukopenia (pancytopenia: all low)

4. Jaundice

Mechanism		Example
• Excessive production of bilirubin • Reduced hepatic uptake • Impaired conjugation	Unconjugated	← Hemolytic anemias*, pernicious anemia ← Hepatocellular e.g., cirrhosis ← Physiologic jaundice newborn
• Decreased hepatocellular excretion • Impaired bile flow (both intrahepatic and extrahepatic)	Conjugated	← Hepatocellular damage (e.g. viral /drug induced hepatitis*) ← Inflammatory destruction of intrahepatic bile ducts (e.g. primary biliary cirrhosis); obstruction to flow of bile*

* Most important

5. Cholestasis

- Results from impaired bile flow due to hepatocellular dysfunction or intrahepatic or extrahepatic biliary obstruction
- Characterized by systemic retention of not only bilirubin but also other solutes eliminated in bile

✓*Pruritus* is the presenting symptom, presumably related to the elevation in plasma bile acids and their deposition in peripheral tissues, particularly skin
✓A *characteristic laboratory finding is elevated serum alkaline phosphatase,* an enzyme present in bile duct epithelium and in the canalicular membrane of hepatocytes
✓Other manifestations of reduced bile flow relate to intestinal malabsorption, including inadequate absorption of the fat-soluble vitamins A, D, and K

6. Hepatorenal Syndrome

- *A*ppearance of renal failure in individuals with severe chronic liver disease
- No intrinsic morphologic or functional causes for the renal failure
- May be due to:
  - Decreased renal perfusion pressure due to splanchnic vasodilation & systemic vasoconstriction
  - Activation of the renal sympathetic nervous system with vasoconstriction of the afferent renal arterioles
  - Increased synthesis of renal vasoactive mediators, that decrease glomerular filtration

✓Onset = Drop in urine output, associated with rising blood urea nitrogen and creatinine values

7. Esophageal Varices

Before returning to the heart (via the IVC), blood from the GI tract first passes through the liver by means of the portal vein.

★GI tract ➔ Portal vein ➔ Liver ➔ IVC ➔ Heart ➔ Systemic circulation

➔This is responsible for the first-pass effect in which drugs and other materials absorbed in the intestines are processed by the liver before entering systemic circulation.

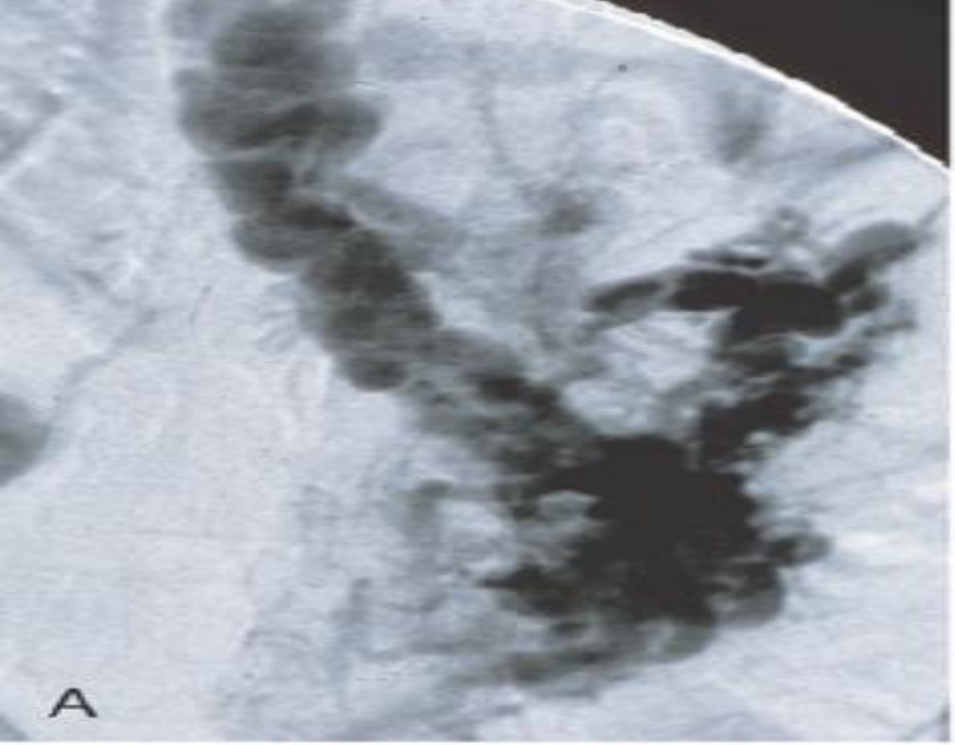
•**When this flow is blocked it can lead to portal hypertension which causes <u>esophageal varices</u>; an important cause of <u>esophageal bleeding</u>**

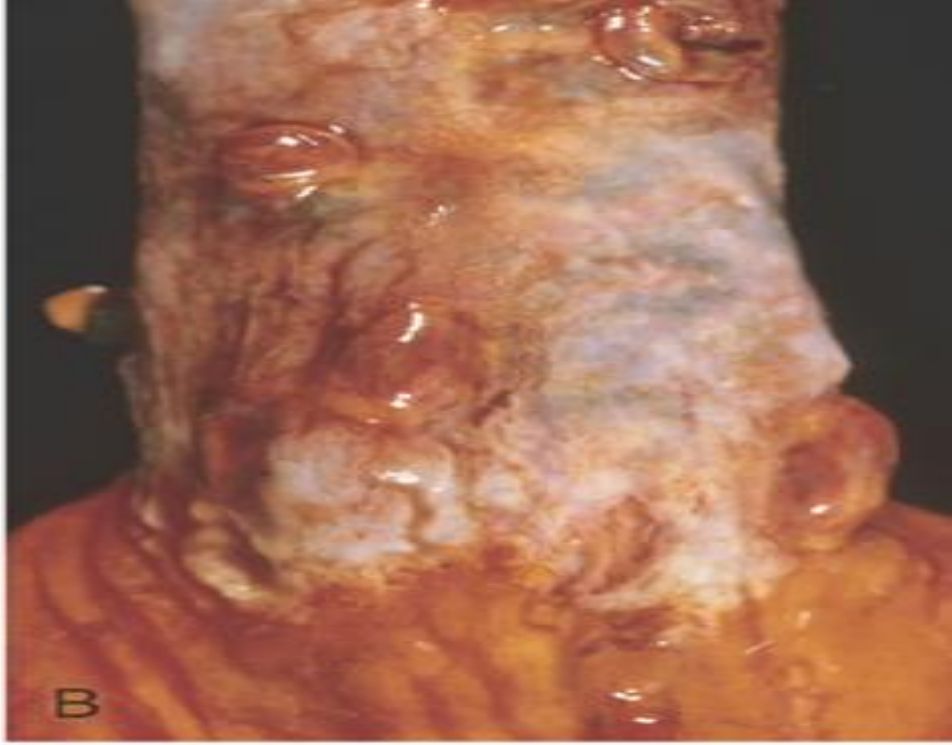
PATHOGENESIS:

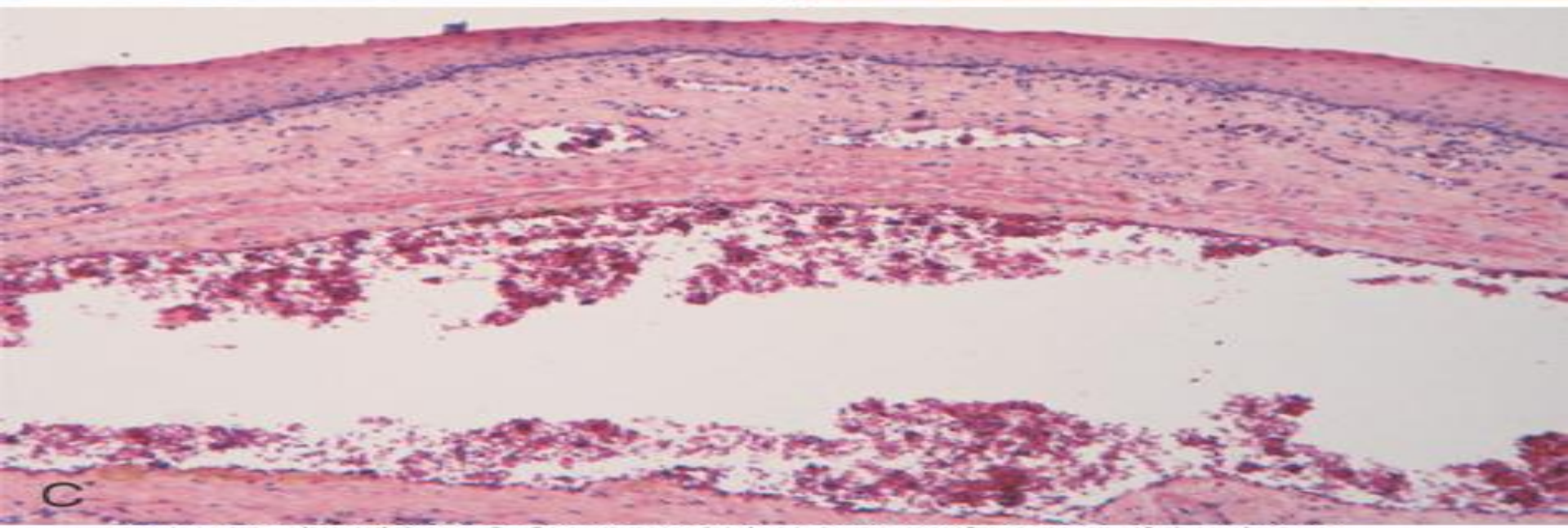
1. Results form development of collateral channels at sites where the portal and caval systems communicate. Although these collateral veins allow some drainage to occur, they lead to development of a congested subepithelial and submucosal venous plexus within the distal esophagus.
   ➔ varices.
   ➔90% of cirrhotic patients
2. Fatty Liver
3. Hepatic Schiztosomiasis

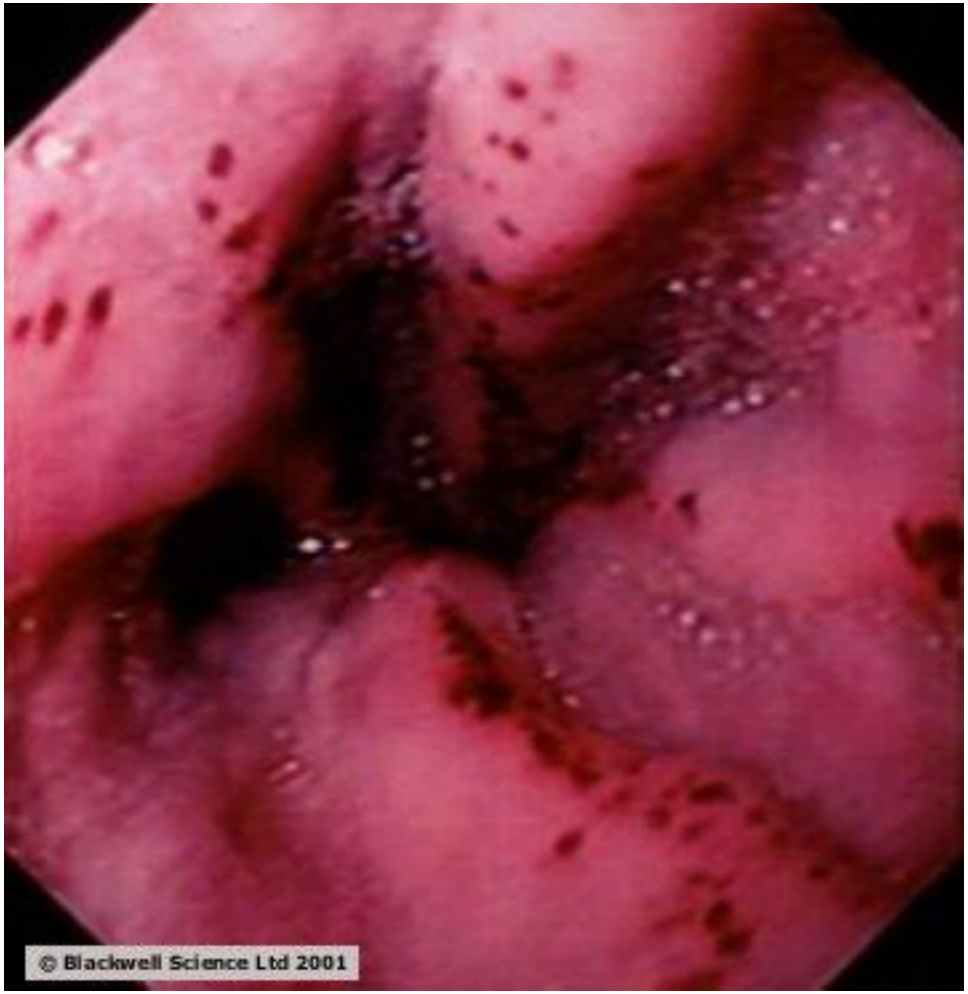
Morphology:

- Detected by Venogram
- Appear as tortuous dilated veins lying primarily within the submucosa of the distal esophagus and proximal stomach.
- Venous channels directly beneath the esophageal epithelium may also become massively dilated.
- HOWEVER: varices may not be grossly obvious in surgical or postmortem specimens, because they collapse in the absence of blood flow.
- In case of rupture:
  Hemorrhage into the lumen or esophageal wall, in which case the overlying mucosa appears ulcerated and necrotic.
- Previous rupture:
  Venous thrombosis, inflammation, and evidence of prior therapy may also be present.









Esophageal Varices

Venogram

Clinical Features:

Asymptomatic or rupture → Massive hematesis

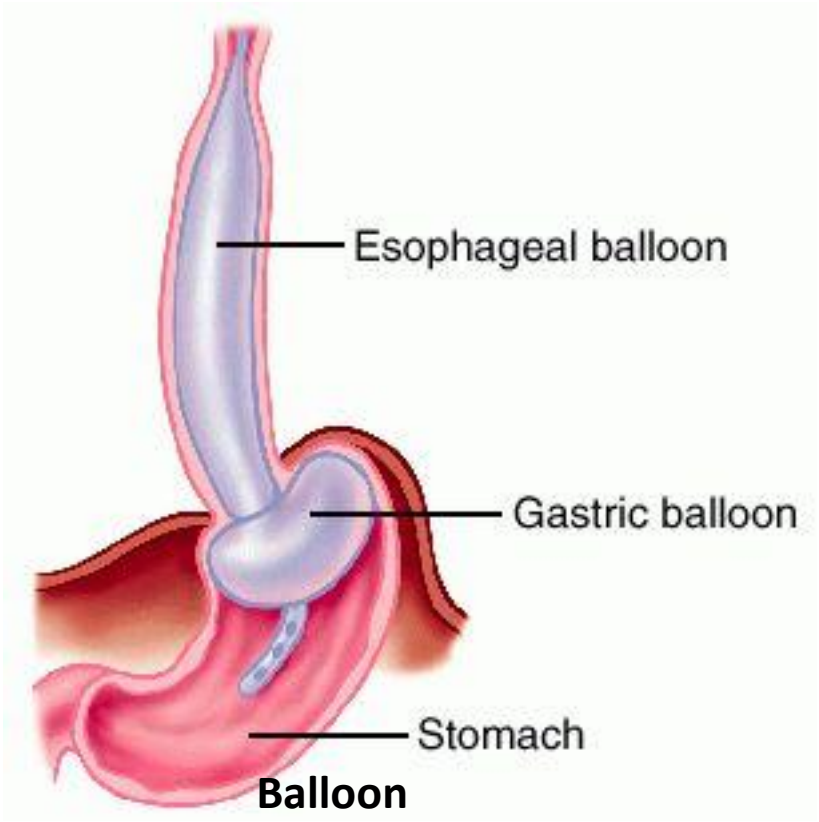
Hematesis: vomitting blood.

- Inflammatory erosion of thinned overlying mucosa
- Increased tension in progressively dilated veins
- Increased vascular hydrostatic pressure associated with vomiting are likely to contribute

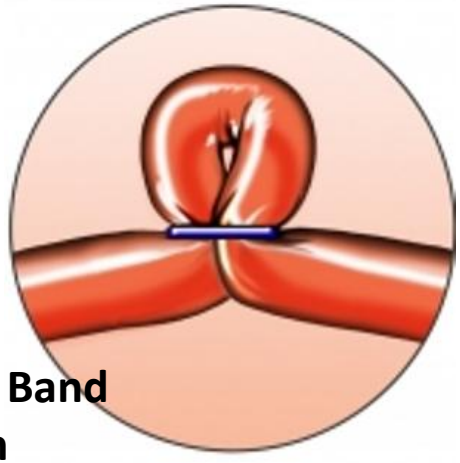
Treatment:

- Sclerotherapy
- Endoscopic balloon tamponade
- Endoscopic rubber band ligation

Sclerotherapy



Balloon Tamponade



Rubber Band Ligation

Prognosis:

- Half of patients die from the first bleeding episode either as a direct consequence of hemorrhage or following hepatic coma triggered by hypovolemic shock.
- Additional 50% within 1 year.
- Each episode has a similar rate of mortality.
- Over half of deaths among individuals with advanced cirrhosis result from variceal rupture.

Further complications:

- Hepatic encephalopathy
- Hepatocellular carcinoma