# L28: Complications of Liver Cirrhosis

Medicine433@yahoo.com

MEDICINE 433

# objectives

1. Understand the basic mechanisms of portal hypertension

2. Recognized the classic presentations of portal hypertension complications

3. Get an idea on the management of these complications

**Color index:** Step up to medicine , slide , Doctor's note , Davidson , Extra Explanation

# What is Liver Cirrhosis?

- Cirrhosis is a chronic liver disease characterized by fibrosis, disruption of the liver architecture, and widespread nodules in the liver. The fibrous tissue replaces damaged or dead hepatocytes

- Diffuse fibrosis of the liver with nodule formation

- It is considered as abnormal response of the liver to any chronic injury

**Cirrhosis**

• The most common causes of cirrhosis are alcoholic liver disease and chronic viral infection (especially hepatitis C).

• **Liver biopsy** is the gold standard for diagnosis of cirrhosis.

# What is Liver Cirrhosis?

- Cirrhosis is generally irreversible when advanced. In early stages, specific treatment of the cause of cirrhosis may improve or reverse the condition.

- The distortion of liver anatomy causes two major events:

a. Decreased blood flow through the liver with subsequent hypertension in portal circulation (portal hypertension)—This has widespread manifestations, including ascites, peripheral edema, splenomegaly, and varicosity of veins “back stream” in the circulation).

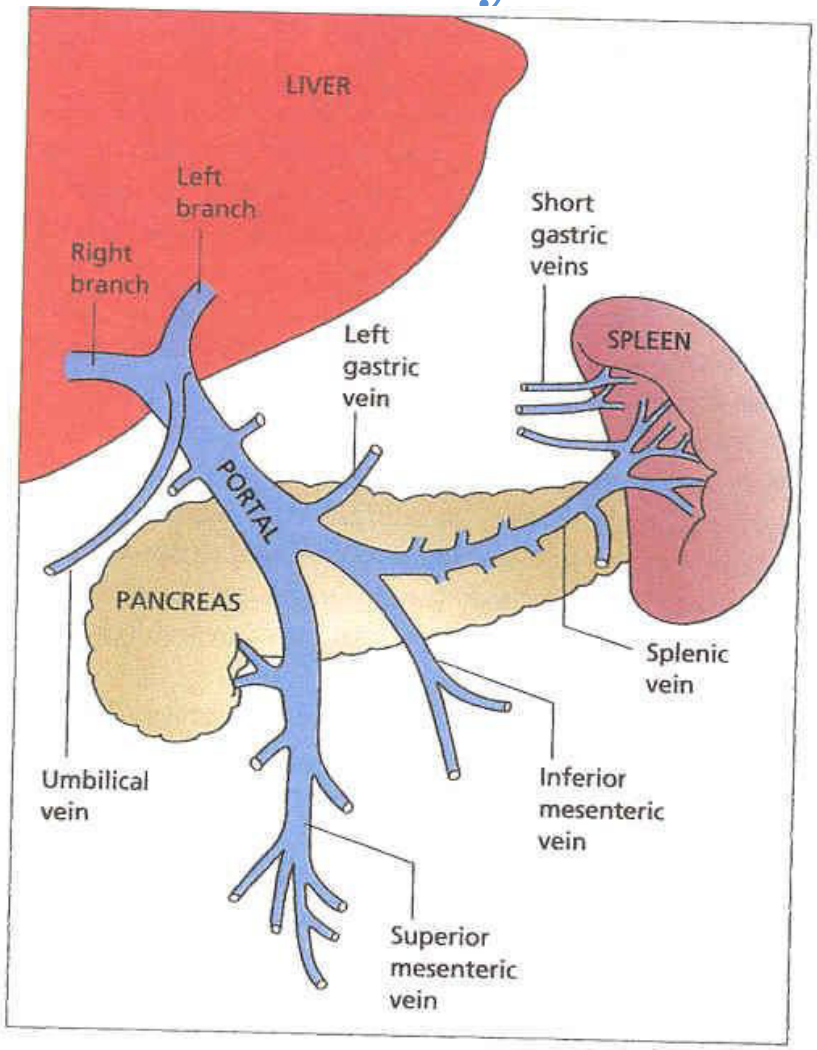
b. Hepatocellular failure that leads to impairment of biochemical functions, such as decreased albumin synthesis.

# Causes of Cirrhosis

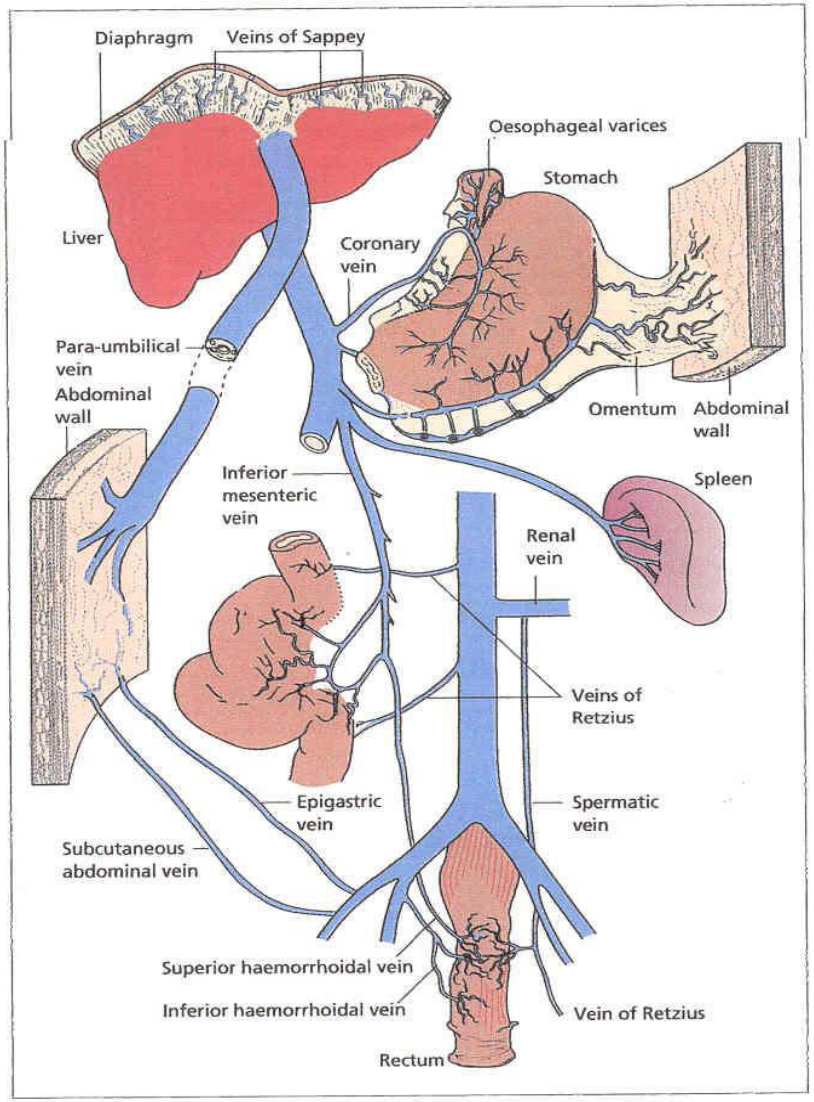
" World-wide, the most common causes of cirrhosis are chronic viral hepatitis , prolonged excessive alcohol consumption and NAFLD ( non alcoholic fatty liver disease)"

1. Alcohol(most common cause).
2. Chronic viral hepatitis (especially B and C ). (next most common causes).
3. Metabolic: hemochromatosis, Wilson dis, alfa-1-antitrypsin, NASH
4. Prolonged cholestasis (primary biliary cirrhosis, primary sclerosing cholangitis)
5. Autoimmune diseases (autoimmune hepatitis)
6. Drugs and toxins
7. Persistent blockage of venous return from the liver, such as occurs in veno-occlusive disease

# Anatomy of the portal venous system

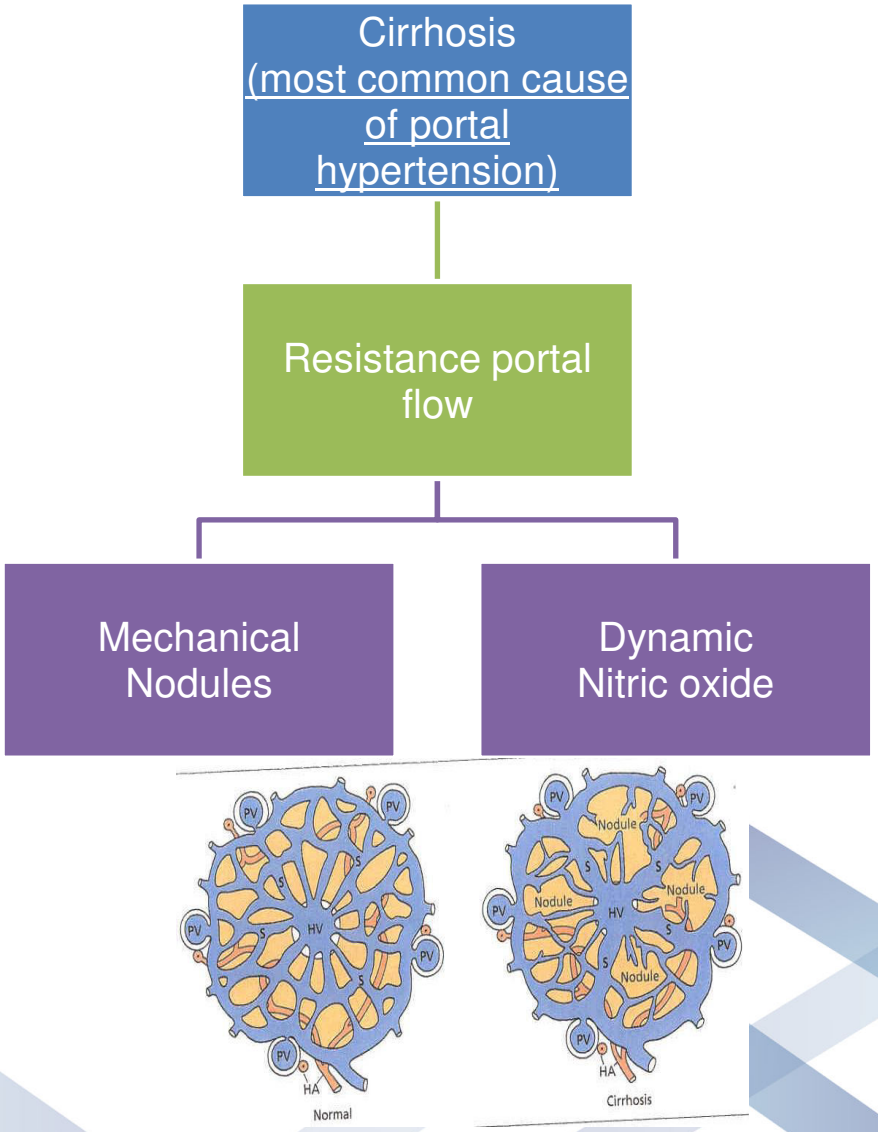



# Collaterals



# Mechanism of Portal HTN

Increased portal vascular resistance leads to a gradual reduction in the flow of portal blood to the liver and simultaneously to the development of collateral vessels allowing portal blood to bypass the liver and enter the systemic circulation directly. Portosystemic shunting occurs, particularly in the gastrointestinal tract and especially the distal oesophagus, stomach and rectum, in the anterior abdominal wall. anaemia is seldom attributed directly to hypersplenism; if anaemia is found, a source of bleeding should be sought.




* The Effect of The Liver Nodule

# Clinical manifestation

- Some patients have no overt clinical findings, especially early in the disease because other area of the liver will compensate the function of affected area.
- PHT is the primary cause of all liver cirrhosis manifestation .
- Bleeding (hematemesis, melena, hematochezia) secondary to esophagogastric varices is the most life-threatening complication of portal HTN.

**23.27 Clinical features of hepatic cirrhosis**

- Hepatomegaly (although liver may also be small)
- Jaundice
- Ascites
- Circulatory changes
  Spider telangiectasia, palmar erythema, cyanosis
- Endocrine changes
  Loss of libido, hair loss
  Men: gynaecomastia, testicular atrophy, impotence
  Women: breast atrophy, irregular menses, amenorrhoea
- Haemorrhagic tendency
  Bruises, purpura, epistaxis
- Portal hypertension
  Splenomegaly, collateral vessels, variceal bleeding
- Hepatic (portosystemic) encephalopathy
- Other features
  Pigmentation, digital clubbing, Dupuytren's contracture

# Complications of Portal Hypertension

**23.32 Complications of portal hypertension**

- Variceal bleeding: oesophageal, gastric, other (rare)
- Congestive gastropathy
- Hypersplenism
- Ascites*
- Iron deficiency anaemia
- Renal failure
- Hepatic encephalopathy

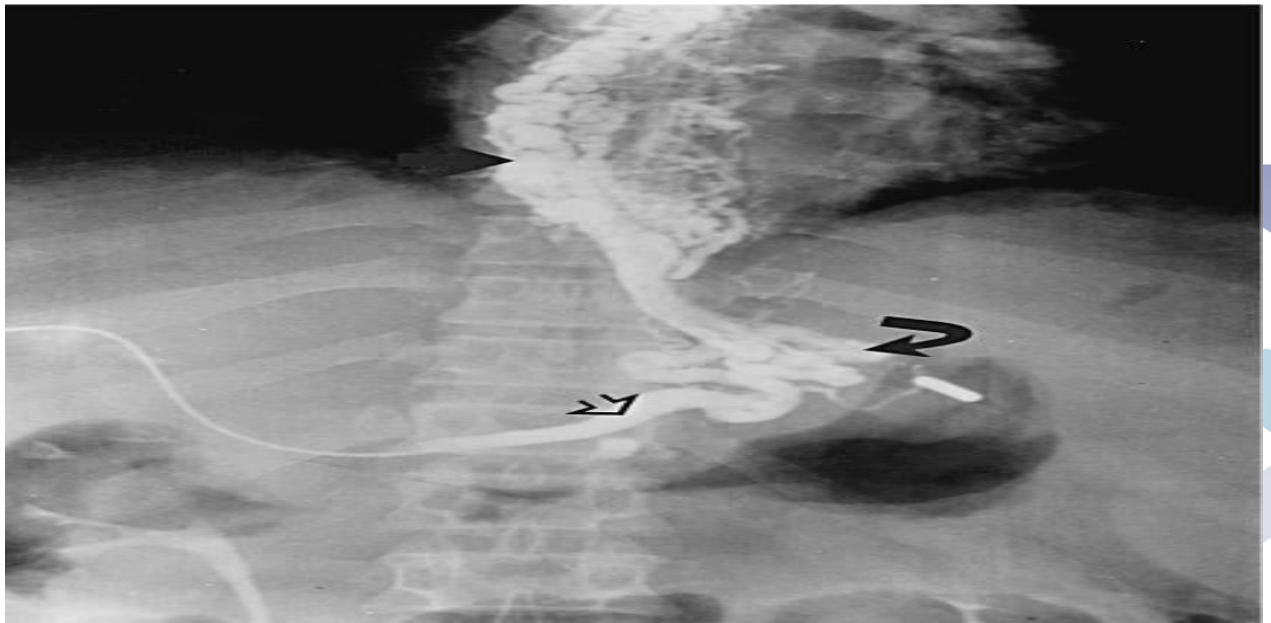
## 1- Varices

- Esophagus 90% (the most common )
- Gastric 10%
- Colo-rectal
- Portal hypertensive gastropathy
- Caput medusae (distention of abdominal wall veins)

Classic signs of chronic liver disease:
- Ascites
- Varices
- Gynecomastia, testicular atrophy
- Palmar erythema, spider angiomas on skin
- Hemorrhoids
- Caput medusae

# 1- Easophageal varices

- 1-easophageal varices : (the most common)
- Variceal hemorrhage has a high mortality rate. Patients with cirrhosis should be evaluated to document presence of varices and risk of hemorrhage.
- Clinical features include massive hematemesis, melena, and exacerbation of hepatic encephalopathy.



# Diagnosis

- History : Hematemesis, melena
- Physical examination
- Ultrasound abdomen
- Endoscopy

# Management

| General | Specific |
|---|---|
| ✓ABC<br>✓ 2 IV Lines<br>✓ Type and cross match<br>✓ Resuscitation<br>( IVF – Blood)<br>✓Platelet transfusion (platelet <75,000)<br>✓ Fresh frozen plasma (Correct Pt) | ✓ IV vasoconstrictors (Octreotide) decreases bleeding<br>✓ Endoscopic therapy<br>✓ Banding<br>✓ Sclerotherapy<br>✓ Shunting<br>✓ Surgical<br>✓ TIPS<br>transjugular intrahepatic portal-systemic shunt |

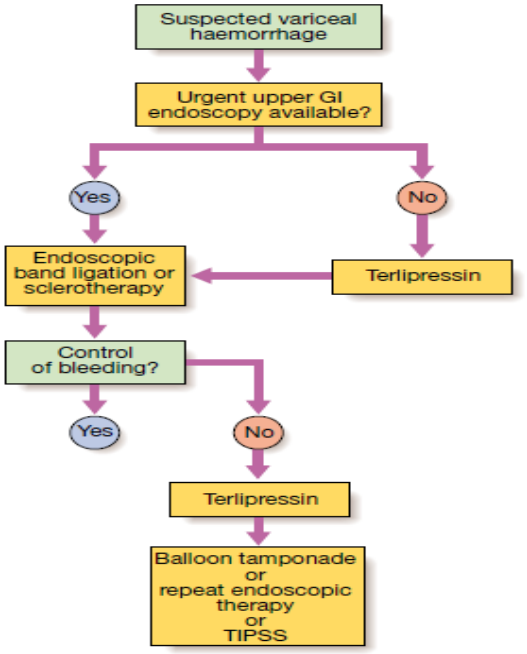



**Fig. 23.21 Management of acute bleeding from oesophageal varices.** (TIPSS = transjugular intrahepatic portosystemic stent shunt)

# Types of Shunts

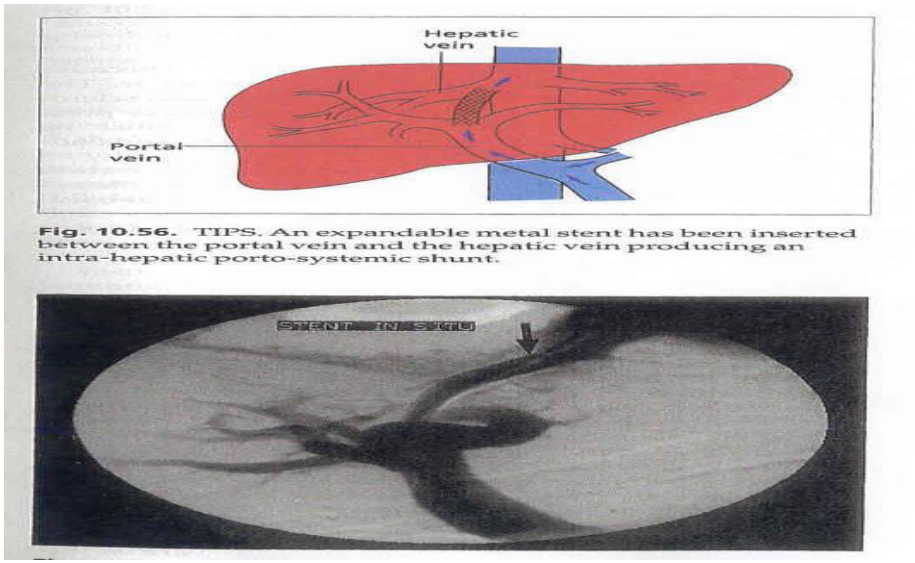
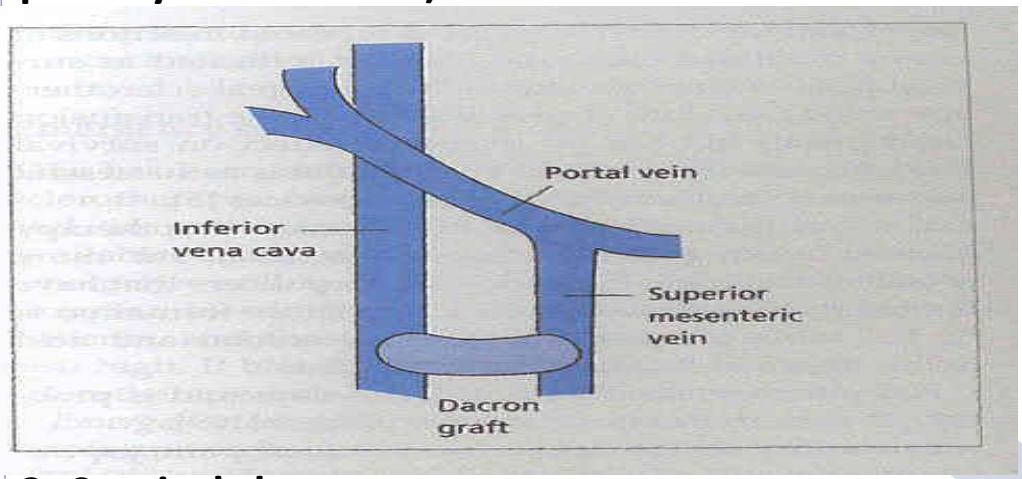


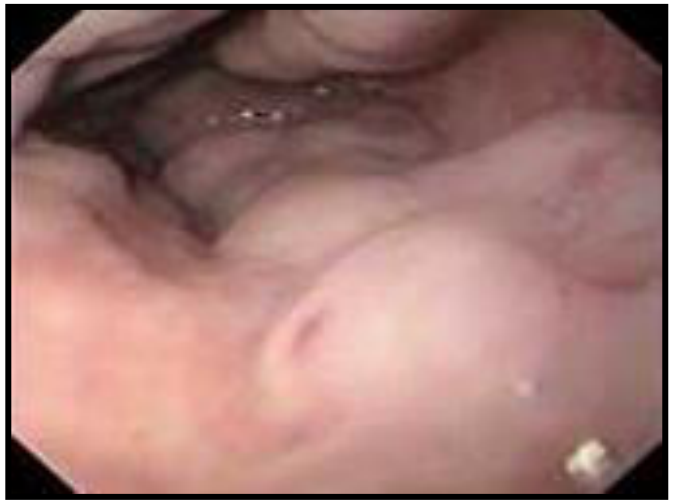

**Fig. 10.56.** TIPS. An expandable metal stent has been inserted between the portal vein and the hepatic vein producing an intra-hepatic porto-systemic shunt.

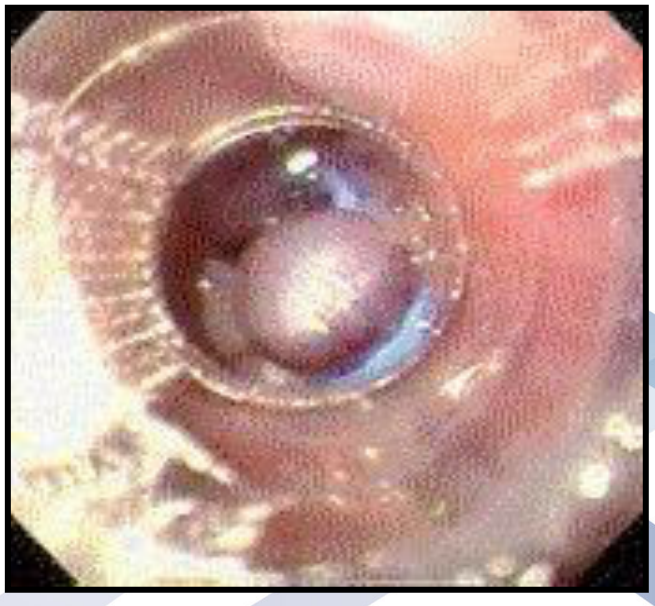
**1-TIPS (Transjugular intrahepatic portosystemic shunt)**




**2- Surgical shunt**

# Variceal Banding





# Treatment of Bleeding Esophageal Varices

- **Variceal ligation/banding**
- Initial endoscopic treatment of choice
- Effective control of active bleeding
- Lower rate of rebleeding than sclerotherapy
- **Endoscopic sclerotherapy**
- Sclerosing substance is injected into varices during endoscopy.
- This controls acute bleeding in 80% to 90% of cases.
- Up to 50% of patients may have rebleeding.
- **IV vasopressin**
- This is an alternative to octreotide, but is rarely used due to the risk of complications.
- Vasoconstriction of mesenteric vessels reduces portal pressure.
- **IV octreotide infusion**
- Has replaced vasopressin as first-line therapy; causes splanchnic vasoconstriction and reduces portal
pressure
- Fewer side effects than vasopressin
- **Other options** include esophageal balloon tamponade (Sengstaken-Blakemore tube is a temporary measure),
repeat sclerotherapy, TIPS, surgical shunts, and liver transplantation.

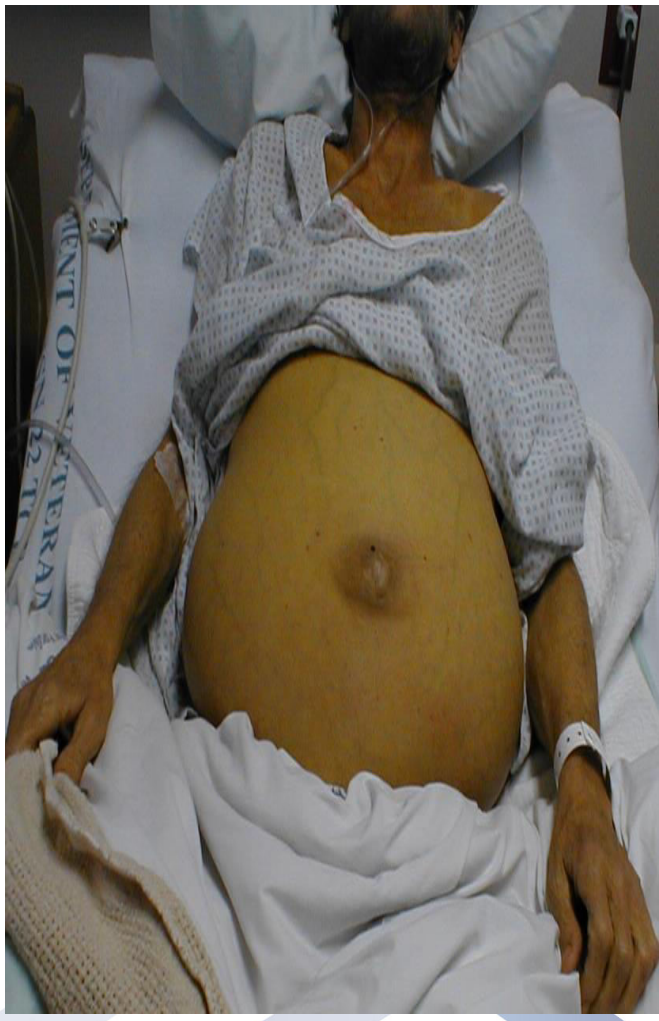
# Prevention

1. Treat underlying disease
2. Endoscopic banding protocol
3. B-blockers
4. Liver transplantation

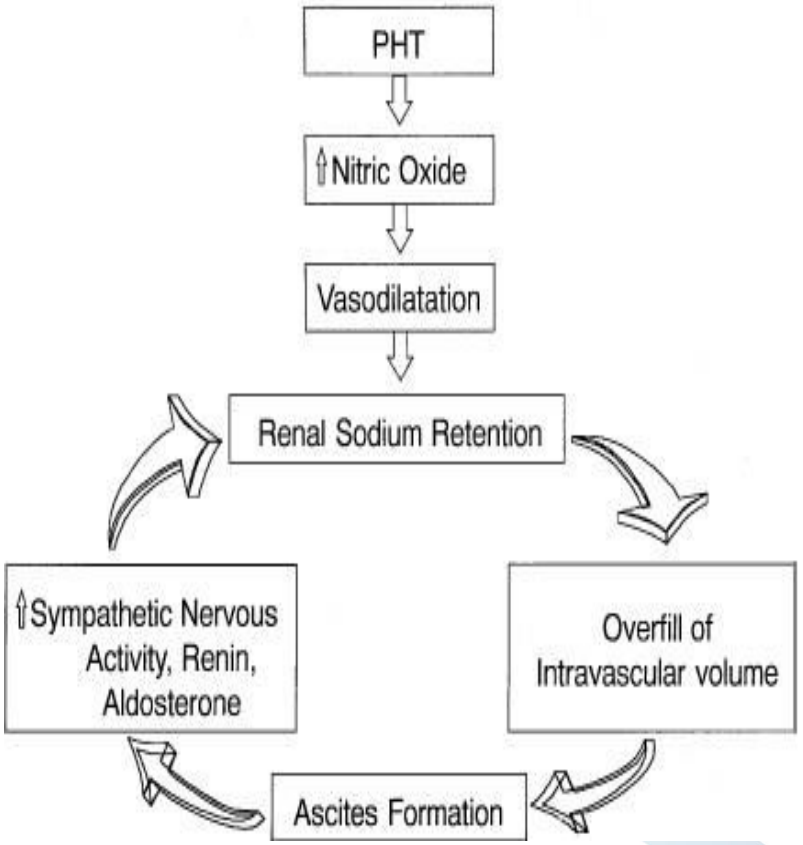
# 2- Ascites

- Definitiona. Accumulation of fluid in the peritoneal cavity due to portal HTN (increased hydrostatic pressure) and hypoalbuminemia (reduced oncotic pressure).

- Ascites is the most common complication of cirrhosis.
- Small amounts of ascites are asymptomatic, but larger accumulations of fluid (> 1 L) are clinically evident. In obese patients, much larger volumes of ascites may accumulate before they are detectable clinically.



# Mechanism of Ascites



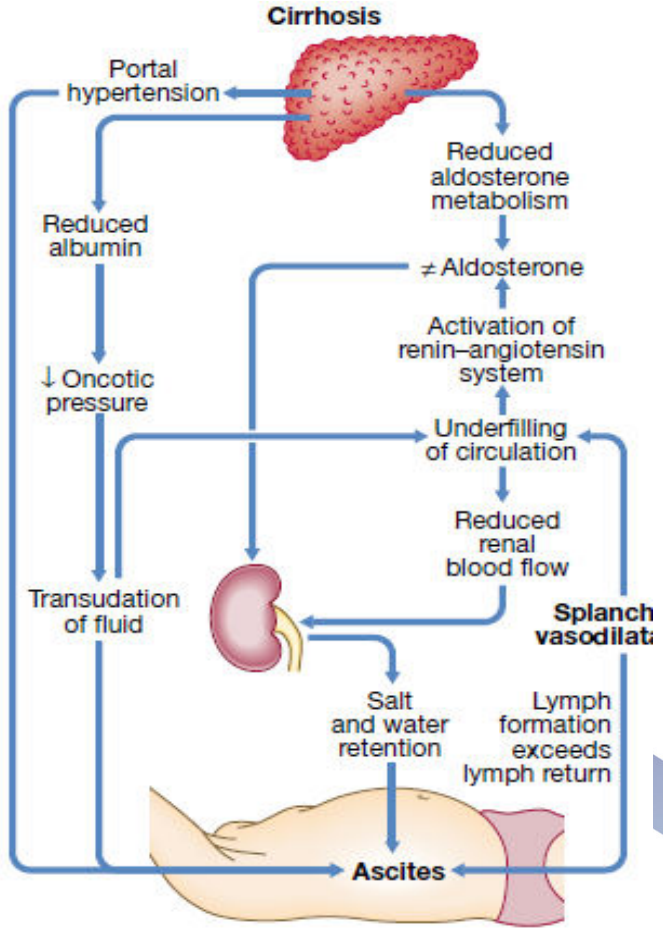




Fig. 23.16 Pathogenesis of ascites.

*Mainly By the PHT mechanism.

# Causes of Ascites

1. Liver disease: cirrhosis
2. Right sided heart failure
3. Kidney disease (nephrotic syndrome)
4. Low albumin (malnutrition, bowel loss)
5. Peritonial infection (TB…)
6. Peritonial cancer

**23.19 Causes of ascites**

| Common causes | |
|---|---|
| • Malignant disease<br>Hepatic<br>Peritoneal | • Cardiac failure<br>• Hepatic cirrhosis |
| **Other causes** | |
| • Hypoproteinaemia<br>Nephrotic syndrome<br>Protein-losing enteropathy<br>Malnutrition<br>• Hepatic venous occlusion (p. 973)<br>Budd–Chiari syndrome<br>Veno-occlusive disease | • Pancreatitis<br>• Lymphatic obstruction<br>• Infection<br>Tuberculosis |
| **Rare causes** | |
| • Meigs' syndrome* | • Hypothyroidism |

*Meigs' syndrome is the association of a right pleural effusion with or without ascites and a benign ovarian tumour. The ascites resolves on removal of the tumour.

# Presentation & Diagnosis

| History | Physical exam | Diagnosis |
|---|---|---|
| ▪ Increased abdominal girth<br>▪ Increased wt | ▪ Bulging flanks<br>▪ Shifting dullness<br>▪ Fluid wave<br>▪ "abdominal distension, fullness in the flanks, shifting dullness on percussion and, when the ascites is marked, a fluid thrill." | ▪ Physical examination<br>▪ Ultrasound *Diagnostic tool*<br>▪ Ascitic tap<br>▪ WBC (>250 PMN: SBP)<br>▪ RBC<br>▪ SAAG (serum albumin to ascitic fluid albumin gradient)<br>>11 mg/dl : portal hypertension<br><11 mg/dl : Other |

**Classification of Ascites by the Serum Albumin-Ascites Gradient**

| High albumin gradient (SAAG ≥1.1 g/dL) | Low albumin gradient (SAAG <1.1 g/dL) |
|---|---|
| Cirrhosis | Peritoneal carcinomatosis |
| Alcoholic hepatitis | Peritoneal tuberculosis |
| Congestive heart failure | Pancreatitis |
| Massive hepatic metastases | Serositis |
| | Nephrotic syndrome |
| *Portal hypertension or heart failure | *Peritonial disease or kidney disease |

# Treatment

| General | Resistant |
| --- | --- |
| ✓ Treat the underlying disease<br>✓ Salt restriction (<2gm/d)<br>✓ Diuretics<br>✓ Loop diuretic (Lasix)<br>✓ Aldosterone inhibitor (Spironolactone)<br><br>*If general treatment doesn't work: recurrent tapping<br>*If recurrent tapping doesn't work: TIPS | ✓ Recurrent tapping<br>✓ TIPS<br>✓ Liver transplantation |

**Monitoring patients with cirrhosis**

- Order periodic laboratory values every 3 to 4 months (CBC, renal function tests, electrolytes, LFTs, and coagulation tests).
- Perform an endoscopy to determine the presence of esophageal varices.
- If hepatocellular carcinoma is suspected, perform a CT-guided biopsy for diagnosis.

Ascites can be managed by salt restriction and diuretics in most cases.

# Spontaneous bacterial peritonitis (SBP)

- infected ascitic fluid; occurs in up to 20% of patients hospitalized for ascites, most isolated etiological agents are of enteric origin such Escherichia coli (most common), Klebsiella or Streptococcus pneumonia.
- Clinical features: abdominal pain, fever, vomiting, rebound tenderness and absent bowel sounds in a patient with obvious features of cirrhosis and ascites. SBP may lead to sepsis
- Mortality is high
- Dx: Diagnostic paracentesis may show cloudy fluid and **ascitic tap = PMN>250**
- Treatment : third generation cephalosporin IV.

Etiologic agents
- Escherichia coli (most common)
- Klebsiella
- Streptococcus pneumoniae

# 3- Hepatic Encephalopathy

- Toxic metabolites (there are many, but **ammonia** is believed to be most important) that are normally detoxified or removed by the liver accumulate and reach the brain.
- Occurs in 50% of all cases of cirrhosis, with varying severity
- Precipitants include alkalosis, hypokalemia (e.g., due to diuretics), sedating drugs (narcotics, sleeping medications), GI bleeding, systemic infection, and hypovolemia.
- Reversible decrease in neurological function secondary to liver disease.
- Hepatic encephalopathy is a neuropsychiatric syndrome caused by chronic liver disease. As encephalopathy progresses, confusion is followed by coma.
- Acute: seen with acute liver failure
- Acute on chronic:  established cirrhosis

Pathophysiology of hepatic encephalopathy:
Liver is damaged, so there is no detoxification of blood, leading to ammonia (neurotoxin) existing in the brain (كبدة خربان مخ خربان)

# Clinical features

- Reversal of sleep pattern
- Disturbed consciousness
- Personality changes
- Intellectual deterioration
- Fetor hepaticus

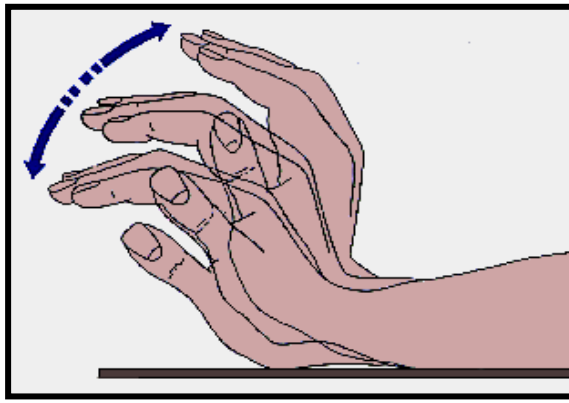
musty odor of breath

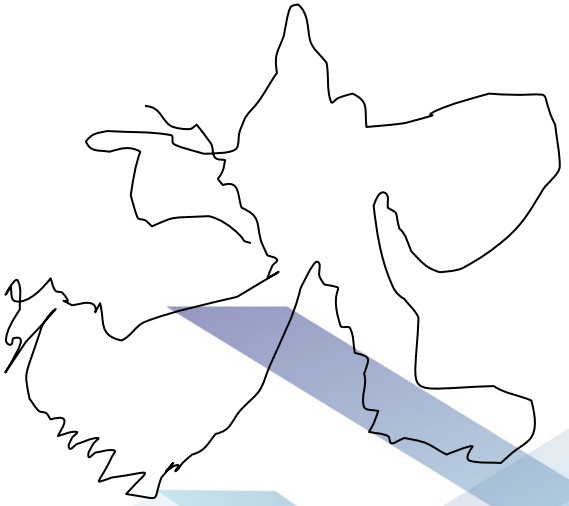
- Astrexis

Pathophysiology of flapping tremor:These neurotoxins prevent the nerve conduction

- Fluctuating
- Rigidity, hyperreflexia

Flapping Tremor



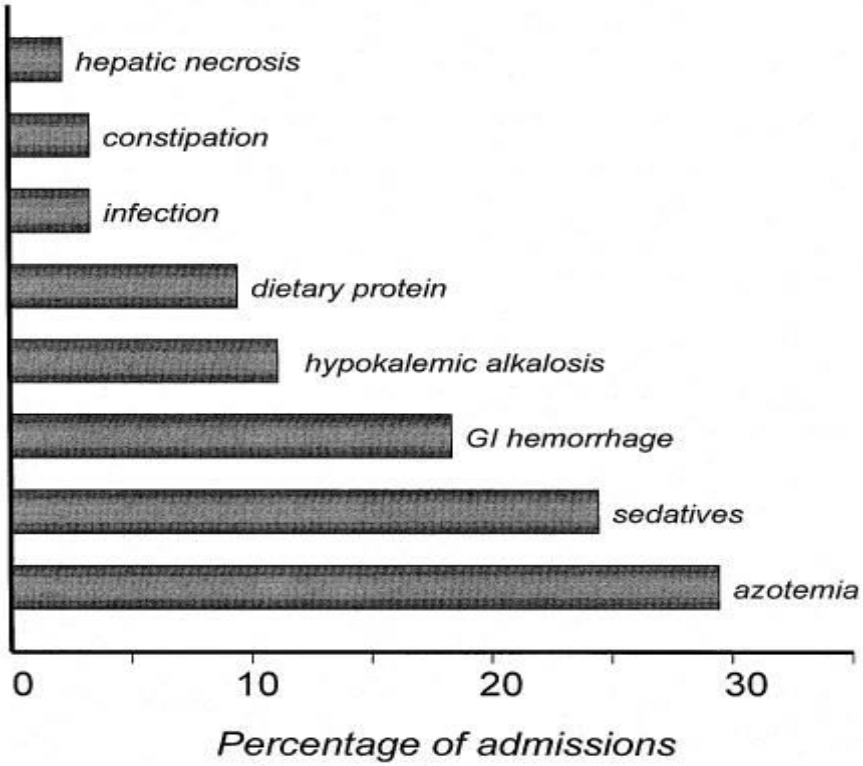


Drawing Tests
(it is used to determine the level of progression of patients with Hepatic Encephalopathy )

Table 79–1 | **Clinical Stages of Hepatic Encephalopathy**

| CLINICAL STAGE | INTELLECTUAL FUNCTION | NEUROMUSCULAR FUNCTION |
|---|---|---|
| **Subclinical** | Normal examination, but work or driving may be impaired | Subtle changes on psychometric or number connection tests |
| **Stage 1** | Impaired attention, irritability, depression, or personality change | Tremor, incoordination, apraxia |
| **Stage 2** | Drowsiness, behavioral changes, poor memory and computation, sleep disorders | Asterixis, slowed or slurred speech, ataxia |
| **Stage 3** | Confusion and disorientation, somnolence, amnesia | Hypoactive reflexes, nystagmus, clonus, and muscular rigidity |
| **Stage 4** | Stupor and coma | Dilated pupils and decerebrate posturing; oculocephalic reflex; absence of response to stimuli in advanced stages |

# Hepatic Encephalopathy Exacerbating factors



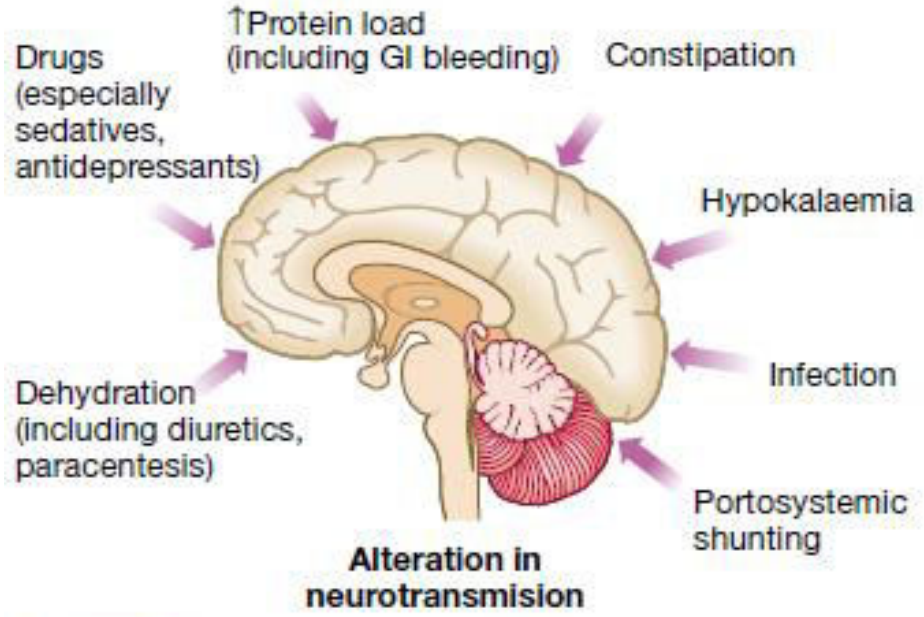




Fig. 23.17 Factors precipitating hepatic encephalopathy.

# Hepatic Encephalopathy

| Treatment | Complication |
| --- | --- |
| • Identify and treat precipitation factor.<br>• Treat underlying liver disease<br>• Normal protein diet.<br>• Antibiotics (**Neomycin**, metronidazole)<br>• Lactolose "osmotic laxative effect, reduces the pH of the colonic content, thereby limiting colonic ammonia absorption."<br>• Transplantation | Hepatorenal syndrome—indicates end-stage liver disease.<br>. Progressive renal failure in advanced liver disease, secondary to renal hypoperfusion resulting from vasoconstriction of renal vessels Clinical features: azotemia, oliguria, hyponatremia, hypotension, low urine sodium.<br>Hyperestrinism<br>a-Spider angiomas —dilated cutaneous arterioles with central red spot and reddish extensions that radiate outward like a spider's web.<br>b-Palmar erythema<br>c. Gynecomastia and Testicular atrophy |

# 4- Hepatocellular Carcinoma

- One of the most common cancers in Saudi Men
- It develops in patients with cirrhosis usually
- Detected by ultrasound and diagnosed by CT pr MRI
- Poor prognosis *so we have to prevent it from its early stages*
- Multiple treatment modalities
- Liver cirrhosis patients must be screened every 6 months to detect any small HCC

In the old, Alpha-fetoprotein and US are the most accurate screeners, nowadays Alpha-fetoprotein is less accurate ( الخلاصة من دا الكلام ان الدكاترة يجيبون اسئلتهم من بنك الاسئلة اللي هو اسئلة قديمة ومو متحدثة , فأذا جاك سؤال ايش هوا افضل سكرينر فالجواب هو الالترا ساوند و الفافيتوبروتين)

## Treatment

1. Treat underlying cause—e.g., abstinence from alcohol, interferons for hepatitis B and C
2. Avoid agents that may cause injury to liver, such as acetaminophen, alcohol.
3. Once cirrhosis develops, aim treatment at managing any complications that arise
The most serious complications are variceal bleeding, ascites, and hepatic encephalopathy.
4. Liver transplantation is the only hope for a cure

## 5- Hepatorenal syndrome

a. Progressive renal failure in advanced liver disease, secondary to renal hypoperfusion resulting from vasoconstriction of renal vessels
b. Often precipitated by infection or diuretics
c. This is a functional renal failure—Kidneys are normal in terms of morphology, and no specific causes of renal dysfunction are evident. This condition does not respond to volume expansion.
d. Clinical features**: azotemia, oliguria, hyponatremia, hypotension, low urine sodium (<10 mEq/L)**
e. Treatment: **Liver transplantation** is the only cure. In general, the prognosis is very poor, and the condition is usually fatal without liver transplantation.

## 6- Hyperestrinism

a. Spider angiomas—dilated cutaneous arterioles with central red spot and reddish extensions that radiate outward like a spider's web
b. Palmar erythema
c. Gynecomastia
d. Testicular atrophy

## 7- Coagulopathy

occurs secondary to decreased synthesis of clotting factors.
a. Prolonged prothrombin time (PT); PTT may be prolonged with severe disease.
b. Vitamin K ineffective because it cannot be used by diseased liver.
c. Treat coagulopathy with fresh frozen plasma.

# MCQs

1. Management of acute hematemesis due to varices include which of the followinga-
a- analgesics
b- IV octreotide
c- beta blockers

2. Mechanism of Octreotide
a- Vasoconstriction of peripheral blood vessels
b- inhibits nitric oxide
c- splanchnic vasoconstriction

3.Ascites fluid finds to have more than 300 neutrophils, what is the most likely diagnosis?
a- Inflammation
b- Spontaneous Bacterial Peritonitis (SBP)
c- Not siginficant

4.Managment of chronic liver cirrhosis include
a-high protein diet
b-high fluid intake
c-low protein diet

5. which of the following is a complication of liver cirrhosis
a-hepatic encephalopathy
b-atrial fibrillation
c-arthralgia

Answers : 1-B 2-C 3-B 4-C 5-A

Medicine433

Medicine433

# DONE BY

| Faroq Abdulfattah | Raneem AlOtaibi |
|---|---|
| Turkey AlOtaibi | Hala Ibrahim |
| Omar AlDhasee | Malak AlAboudi |

As you know this was the last lecture in this semester we would like to thank our members and we want them to know that we appreciate “EVERYTHING” they did to make this team especially in this very busy year THANK YOU SO MUCH.

We hope this team work was beneficial to you all and helped you to become better doctors 💙 and don’t forget to Enjoy this year

*Medicine is a science of uncertainty and an art of probability*

MEDICINE 433