



Portal hypertension

Objectives:

- Effects of portal hypertension.
- Clinical features.
- Acute variceal bleeding.
- Ascites.

Resources:

- Davidson's.
- 436 doctor's slides.
- 435' team work.
- Surgical recall.
- Raslan's notes.

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COLOR INDEX:

NOTES , IMPORTANT , EXTRA , DAVIDSON'S

EDITING FILE

FEEDBACK

Basic review: in BLACK is from the doctor's slides

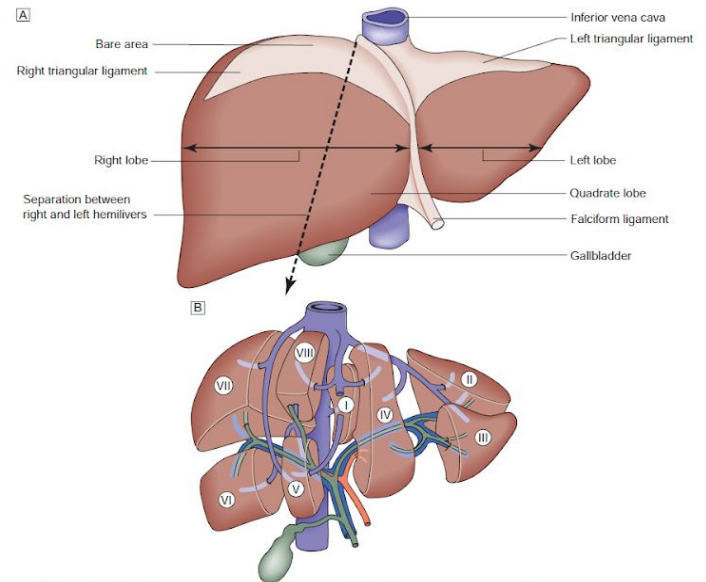
Anatomy of the liver:

-The liver is the largest abdominal organ, it extends from the fifth intercostal space to the right costal margin.
-The liver is divided into a large right lobe and a small left lobe by the attachment of the falciform ligament fissures; the right lobe is further divided into a quadrate lobe and a caudate lobe. However, the liver **segmental anatomy**, as defined by the distribution of its blood supply, is important to the surgeon.

Segmental anatomy:

The **portal vein and hepatic artery** divide into right and left branches in the porta hepatis, thus separating the two hemilivers. Each hemiliver is further divided into **four segments** corresponding to the main branches of the hepatic artery and portal vein.

In the left hemiliver; segment I corresponds to the **caudate lobe**, segments II and III to the **left lobe** (or left lateral section), and segment IV to the **quadrate lobe**. The remaining segments (V–VIII) comprise the **right hemiliver**.



Blood supply:

The liver normally receives 1500 ml of blood per minute and has a **dual blood supply**, 75% coming from the **portal vein** and 25% from the **hepatic artery**, which supplies 50% of the oxygen requirements.

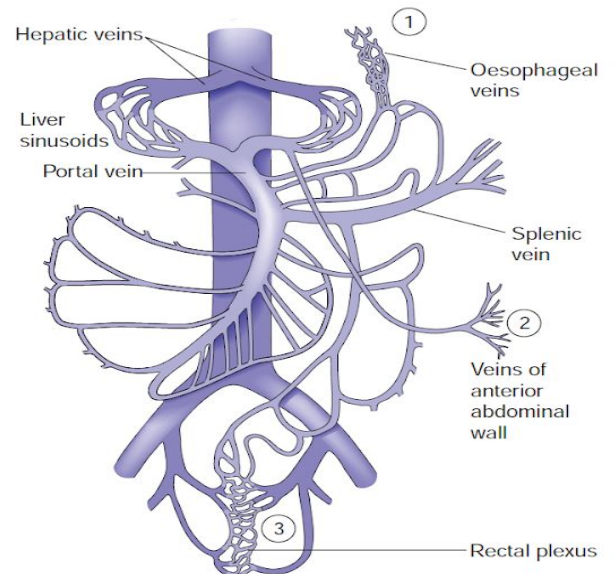
The principal **venous drainage** of the liver is by the **right, middle and left hepatic veins**, which enter the vena cava.

Portal venous system :

It is a specific type of anastomosis that occurs between the veins of portal circulation and those of systemic circulation

- In portal hypertension, these anastomoses open and form venous dilatation called varices.
- Sites: A. Esophagus (lower part). B. Upper Anal canal. C. Paraumbilical region. D. Retroperitoneal. E. Intrahepatic (Patent ductus venosus).

-Collateral pathways develop between the portal and systemic venous circulations. Portosystemic shunting occurs at three principal sites (as in the picture).



Liver function :

1. Responsible for storing glucose as glycogen, or converting it to lactate for release into the systemic circulation.
2. Amino acids are utilized for hepatic and plasma protein synthesis or catabolized to urea.
3. Metabolism of lipids, bilirubin and bile salts, drugs and alcohol.
4. Production of the coagulation factors, including:
 - a. Factor I, factor V, and factor XI.
 - b. Vitamin K dependant factors: factor II, factor VII, factor IX and factor X.
 - c. Protein C, protein S and antithrombin.

The liver is the largest reticuloendothelial organ, it has kupffer cells which remove damaged RBCs, bacteria, viruses and endotoxins.

Radiological investigations of the liver:

1. Ultrasound: ultrasound is the first and initial investigation in liver diseases.
 - a. Non-invasive. So we can use it in the ICU if we have a sick patient post liver resection to check if he has thrombosis or not.

- b. Assesses intra and extrahepatic bile duct dilation or gallbladder distension due to obstruction, and confirm the need for more invasive investigations.
- c. Detects space occupying lesions in the liver and pancreas (although overlying bowel gas may prevent a clear view of the pancreas).
- d. Evaluates vascular system of the liver.
- e. Detects gallstones.

2. Computed tomography (CT): we usually use it with IV contrast, or we can order the triphasic CT scan, which means the CT will be taken with contrast and in hepatic arterial phase will show us only the arterial system in the body. Then the portal venous phase will show us only the portal system. why? bc some tumors only show up in the arterial phase like HCC.

- a. Contrast enhanced CT identifies and stages hepatic, bile duct and pancreatic tumors.
- b. Demonstrates three abnormalities:
 - i. Dilated biliary tree to the level of the obstruction.
 - ii. Vascular abnormality or invasion.
 - iii. Lymphadenopathy or distant metastasis.

*Positron emission tomography (PET-CT) is used for tumor staging and distant metastasis. It is an advanced technique of CT scan in which we use a nuclear material, we don't use it as a first step except if the CT was insensitive or did not show us the tumor clearly.

- 3. Magnetic resonance imaging (MRI): magnetic resonance cholangiopancreatography (MRCP) has largely replaced other forms of invasive radiological imaging of the bile duct and pancreas:
 - a. It has the advantage of not introducing an infection to the biliary system.
 - b. Enables the assessment of the vascular anatomy and the parenchyma of the liver and pancreas. Only indicated in selected cases either to discover the reason of the disease or if we have a mass that is not easy to characterized by imaging.

Liver biopsy can be done with the help of CT guidance for liver diseases and masses. identifies the cause of liver disease

Congenital abnormalities

◆ Liver cyst:

- Polycystic disease is a rare cause of liver enlargement and may be associated with polycystic kidneys as an autosomal dominant trait.
- Histology:
 - The cyst is lined by biliary epithelium and contain serous fluid.
 - Does not communicate with the biliary tree.
- Incidence: Sporadic or polycystic disease.
- Symptoms: patients rarely develop symptoms, they only have them due to the mass effect on surrounding structures.
- Diagnosis:
 - US, CT, MRI.
- Treatment:
 - Only for symptomatic patients. So observation first, if symptoms occur we go for surgery
 - Surgical: deroofting or resection.
 - Aspiration of serous fluid, recurrence with aspiration is high.
 - It may be necessary to combine a deroofting procedure with hepatic resection or to consider liver transplantation.

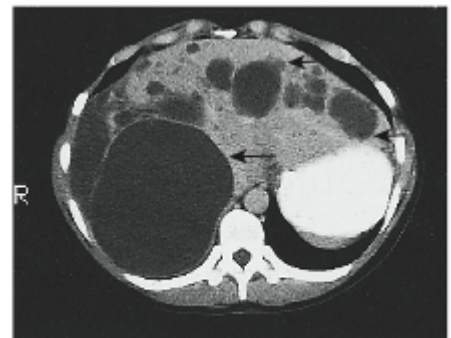
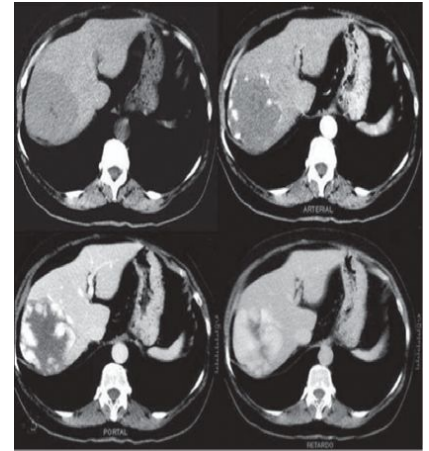


Fig. 14.6 CT demonstrating multiple biliary cysts appearing as hypodense areas within both lobes of the liver (arrowed).

❖ **Cavernous hemangioma:** [video](#)

- One of the most common benign tumors of the liver (affects up to 5% of the population) and may be congenital, most hemangiomas are small solitary subcapsular growths found **incidentally** at laparotomy or autopsy.
- Histology:
 - The nodule is made of cavernous vascular spaces lined by flattened endothelium.
- Women are affected six times more frequently than men.
- Symptoms: patients rarely develop symptoms, they only have it due to the mass effect on surrounding structures, it may cause angioembolization or bleeding if it ruptures.
- Diagnosis:
 - US: sometimes detected as densely hyperechoic lesions.
 - CT and MRI: centripetal filling in of contrast during dynamic imaging.
- Treatment:
 - Observation for asymptomatic patients.
 - Symptomatic: surgical resection.



Hepatic infections

Liver abscesses can be classified as bacterial, parasitic or fungal. Bacterial abscess is the most common type in western medicine, but parasitic infestation is an important cause world-wide. Fungal abscesses are found in patients receiving long-term broad-spectrum antibiotic treatment or immunosuppressive therapy, and may complicate actinomycosis.

❖ **Pyogenic liver abscess:**

- Infection from the biliary system is now more common due to the increasing use of radiological and endoscopic intervention.
- Sources of infection include:
 - Biliary system: cholelithiasis, benign strictures, acute cholangitis, and periampullary tumors.
 - Portal vein: abdominal sepsis:
 - Anorectal abscess, pelvic abscess, postoperative sepsis, intestinal perforation, pancreatic abscess, **appendicitis or diverticulitis (most common)**.
 - Hepatic artery: septic focus anywhere in the body:
 - Endocarditis, vascular sepsis, ENT¹ or dental infection.
 - Direct spread from a contiguous organ:
 - Cholecystitis or empyema of the gallbladder.
 - Gastroduodenal perforation.
 - Colonic perforation.
 - Following a blunt or penetrating injury.
 - In one-third of the patients, the source of infection is indeterminate (cryptogenic).
- Organisms:
 - Gram positive aerobes (hepatic artery spread): **streptococcus milleri**, **staphylococcus aureus**, and enterococcus species.
 - Gram negative aerobes (portal vein spread): **E.coli**, klebsiella pneumonia, pseudomonas aeruginosa, proteus species and enterobacter cloacae.



¹ Ear, nose, throat.

- Gram positive anaerobes (portal vein spread): **bacteroides** and fusobacterium species.
- Symptoms:
 - Fever.
 - Right upper abdominal pain (hypochondrium).
 - Swinging pyrexia of.
 - Chills and rigors.
 - Marked toxicity.
- Signs:
 - Patient looks ill.
 - General malaise and anorexia.
 - Jaundice. **Could be due to obstruction of the biliary system or due to sepsis.**
 - Vital signs: tachycardia, high temperature, +/- hypotension.
 - Abdominal exam: enlarged and tender liver.
- Investigation:
 - Labs:
 - CBC: elevated WBCs.
 - LFTs: elevated enzymes.
 - Coagulation profile: normal or elevated.
 - Blood and pus culture.
 - Radiology:
 - AXR²: air in the liver (gas forming infection).
 - CXR: right sided pleural effusion.
 - **US**: hypoechoic lesion with thick wall along with biliary dilation.
 - **CT**: central hypodense region and peripheral contrast enhancement during the portal phase.
- Treatment:
 - Percutaneous drainage of abscesses under ultrasound or CT guidance. (see picture)
 - Antibiotic therapy.



❖ **Amoebic liver abscess:** it's common in the endemic area

- Pathogenesis:
 - Protozoal parasite infects the large intestines.
 - Ingested cyst in the large intestines > **releases** trophozoites > penetrates the mucosa > portal venous system > liver.
 - **The abscess is large and thin-walled, usually solitary and in the right lobe, and contains brown sterile pus resembling anchovy sauce.**
- Organism: Entamoeba histolytica.
- Clinical features: **patients are less sick than pyogenic liver disease.(its chronic)**
 - Symptoms: right upper quadrant pain, anorexia, nausea, weight loss, night sweats and diarrhea.
 - Physical examination: tender enlargement of the liver with or without jaundice.
 - **Other signs include basal pulmonary collapse, pleural effusion and leukocytosis.**
- Investigations:
 - Labs:
 - CBC: elevated WBCs.
 - Direct and indirect serological tests: (amoebic protein)
 - Indirect haem-agglutination (IHA).
 - Enzyme linked immunosorbent assay (ELISA).
 - Stool analysis: amoebae or cysts.
 - Radiology:
 - US: hypoechoic lesions with **ill-defined margins**.
 - CT: **ill-defined** lesions with complex fluid, enhancing wall with a peripheral zone of

² Abdominal x-ray.

edema around the abscess.

- Treatment:
 - Antibiotics:
 - Metronidazole.
 - Diloxanide furoate (for carriers).
 - Percutaneous aspiration:
 - If no improvement after 3 days of antibiotics.
 - Pyogenic abscess.

◆ Hydatid disease:

- The layers of a hydatid cyst:
 - Pericyst: host tissue formed by the body as a reaction to the parasite.
 - Ectocyst: external layer of the cyst.
 - Endocyst: germinative layer.
- Pathogenesis:
 - The adult tapeworm lives in the intestine of the dog, from which ova are passed in the stool; sheep or goats serve as intermediate host by ingesting the ova whereas humans are accidental hosts.
 - Infestation by one of the two forms of tapeworms in the gastrointestinal system.
 - Ingested ova hatch in the duodenum > portal system > liver.
- Organism: *Echinococcus granulosus* and *E. multilocularis*.
- Clinical features:
 - Could be asymptomatic.
 - Chronic right upper quadrant abdominal pain (the most common presentation).
 - If it ruptures: anaphylactic shock due to absorption of foreign hydatid protein.
 - Communication with biliary system: obstructive jaundice.
- Investigations:
 - Labs:
 - CBC: eosinophilia.
 - Serology tests:
 - Immunoelectrophoresis (IEP): not for follow-up.
 - Enzyme linked immunosorbent assay (ELISA): IgE or IgG4 (4 years), IgM (6 months).
 - Immunoblotting: first-line test for diagnosis and follow-up.
 - Radiology:
 - AXR: calcification.
 - US, CT and MRI: well-defined, circumscribed cystic lesions with a clear membrane (thick wall) and multiple daughter cysts.
 - Treatment:
 - In asymptomatic patients, small calcified cysts may require no treatment.
 - Medical: albendazole or mebendazole for a month before surgery.
 - Surgical:
 - Deroofing. resection of the upper part of liver
 - Pericystectomy (large symptomatic cysts are best managed by complete excision, together with the parasites contained within).
 - Liver resection. Resection of normal tissue with the cyst
 - Puncture-aspiration-injection-re-aspiration (PAIR). If the patient can't go for surgery we do PAIR although it's too risky.

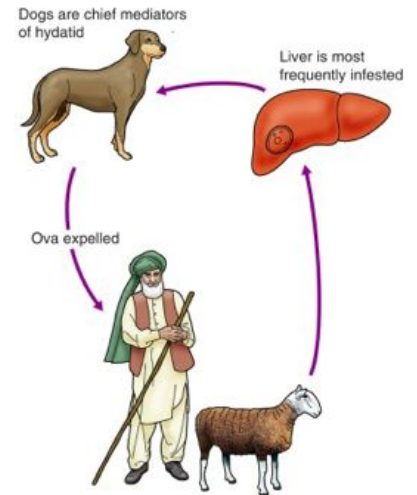
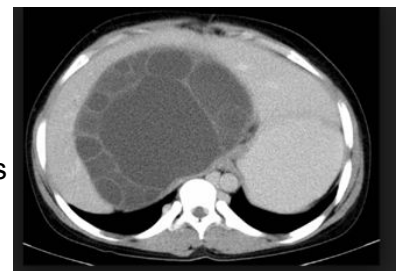
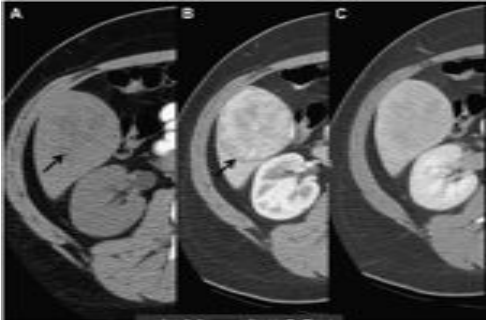
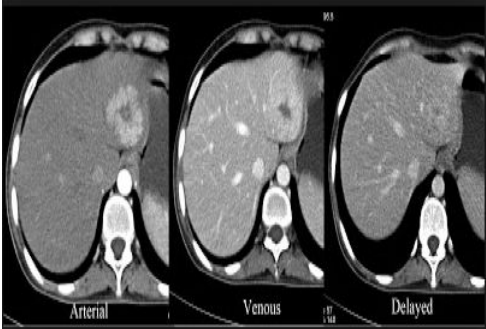


Fig. 14.10
Life cycle of *Echinococcus granulosus*.



Tumors of the liver

		Benign hepatic tumors	
		Liver cell adenoma	Focal nodular hyperplasia (FNH)
Prevalence	Women to men ratio is 9:1. This tumor is relatively uncommon and is found almost exclusively in women.	More common in females.	
Causes	Estrogen and anabolic steroid play a causative role.	-	
Clinical features	<ul style="list-style-type: none"> Right Upper Quadrant pain as a result of hemorrhage within the tumor. Superficial tumors may bleed spontaneously and present with symptoms of hemoperitoneum. 	<ul style="list-style-type: none"> The lesion may be asymptomatic and may regress with time or on withdrawal of oral contraceptives. Right Upper Quadrant pain 	
Complications	<ul style="list-style-type: none"> Rupture > angioembolization. Malignant transformation. 	-	
Investigations	<ul style="list-style-type: none"> US , CT: solitary, well-encapsulated lesions. MRI. <p>MRI and CT are the diagnostic tests.</p>	<ul style="list-style-type: none"> US , CT: it can be differentiated from adenoma by the central fibrous scar. MRI 	
Treatment	<ul style="list-style-type: none"> Female: <ul style="list-style-type: none"> < 5 cm : stop oral contraceptives > 5 cm : surgery (resection) Male: surgery directly because the risk of malignant transformation is higher. 	Observation, such lesions do not undergo malignant transformation and do not require excision unless symptomatic.	
Radiological images			



❖ Malignant hepatic tumors:

➤ Primary:

- Hepatocellular carcinoma (hepatoma)
- Cholangiocarcinoma
- Angiosarcoma
- Hepatic mucinous cystic neoplasm

➤ Secondary (metastatic) tumors.

Malignant hepatic tumors		
	Hepatocellular carcinoma (hepatoma)	Cholangiocarcinoma
Prevalence	More common in males than females.	Adenocarcinoma may arise anywhere in the biliary tree, including intra-hepatic radicles. It accounts for less than 10% of malignant primary neoplasms of the liver in Western medicine, although its incidence is rising
Risk factors	<ul style="list-style-type: none"> • In the west, about two-thirds of patients have pre-existing liver cirrhosis (alcoholic or non-alcoholic), and many others have evidence of hepatitis B or C infection. • In africa, Aflatoxin (derived from the fungus, <i>aspergillus flavus</i>, which contaminates maize and nuts) is an important hepatocarcinogen. 	<ol style="list-style-type: none"> 1) chronic parasitic infestation of the biliary tree 2) Choledochal cysts we resect it when we see it to kill the chances of development to cholangiocarcinoma
Clinical features	<p>In liver cirrhotic patients: Picture</p> <ul style="list-style-type: none"> • Sudden deterioration in liver disease symptoms • Abdominal pain, weight loss, abdominal distension, fever and spontaneous intraperitoneal haemorrhage. <p>Non cirrhosis:</p> <ul style="list-style-type: none"> • Abdominal pain or swelling. 	<ul style="list-style-type: none"> • Jaundice • Abdominal pain, weight loss, anorexia • Enlarged liver. • There may be co-existing biliary infection causing the tumor to falsely present as a hepatic abscess.
Investigations	<ul style="list-style-type: none"> • LFT may be normal or elevated depending on the stage of the disease, CBC, coagulation profile • Screening: <ul style="list-style-type: none"> -US abdomen (shows splenomegaly). -Alpha-fetoprotein (AFP). • CT , MRI: liver lesion with arterial enhancement and early washout on porto-venous phase 	<ul style="list-style-type: none"> ○ Labs: ○ LFT : obstructive Jaundice (increase total bilirubin) ○ CBC , Coagulation Factor , CA 19-9 ○ Radiology: ○ CT , MRI , MRCP, ERCP, PTC: usually we start with CT and MRI if we reach the

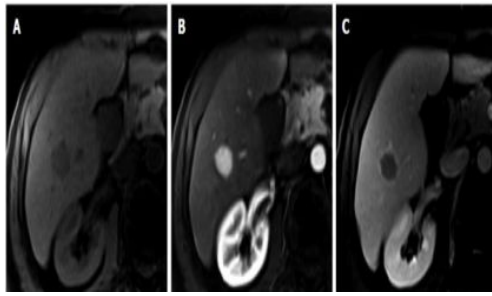


	<p>Diagnosis:</p> <ul style="list-style-type: none"> ○ > 1 cm: one image with characteristic feature diagnostic ○ Cytology: if the nodule is > 1 cm and features are not typical ○ < 1 cm: 3-6 month follow-up 	<p>diagnosis no further investigations are needed. if not the we will proceed to ERCP or PTC.</p>
<p>Treatment</p>	<p>The disease is usually advanced at presentation and the 5-year survival rate is less than 10%.</p> <ol style="list-style-type: none"> 1. Transplantation: <ul style="list-style-type: none"> ● Milan criteria: single tumour of 5 cm or less in diameter, or with no more than three tumour nodules each one 3 cm or less in size (for cirrhotic patients with no contraindication to transplantation). 2. Liver resection: <ul style="list-style-type: none"> ● Non cirrhotic patient because cirrhotic patients will not tolerate the procedure. ● Child A liver cirrhosis (explained later). They may tolerate the procedure but they shouldn't have portal hypertension. 3. Locoregional therapy: its an alternative if the patient can't do transplantation or resection ,the aim is to kill the tumor inside the liver without resection or surgery. <ul style="list-style-type: none"> ● TACE³ ● Local ablation : RFA, microwave energy 4. Chemotherapy: if the patient is not fit to go for surgery or any kind of treatment. <ul style="list-style-type: none"> ● Sorafenib (multitargeted oral kinase inhibitor). 	<ul style="list-style-type: none"> ➤ Curative: <ol style="list-style-type: none"> 1. Resection ➤ Metastatic: <ol style="list-style-type: none"> 2. Palliative chemotherapy

³ Encouraging results have been reported following local embolization with chemotherapy by selective arteriography (**transarterial chemoembolization - TACE**) and percutaneous ablation using radiofrequency and microwave energy have been used to useful effect for small lesions not amenable to surgery.



Radiological images



❖ Metastatic malignant tumor:

- Gastrointestinal tract: the most common sites are: colorectal then stomach, small intestine, pancreas.
- Breast
- ovaries
- Bronchus
- Kidney

Diagnosis: the diagnosis depends on the history of previous surgery to any kind of cancer. If there is no history then order the tumor markers.

- Tumor marker:
 - CEA for colorectal carcinoma.
 - CA 19-9: for pancreatic cancer.
 - CA 125: for ovarian cancer.
- Radiology : CT , MRI, PET CT.

We usually start with CT scan, if the CT scan didn't show the lesion, then we do MRI bc its more sensitive and Specific. We use PET CT to check if there is other Metastasis other than the abdomen.

Treatment:

- Resection
- Palliative chemotherapy

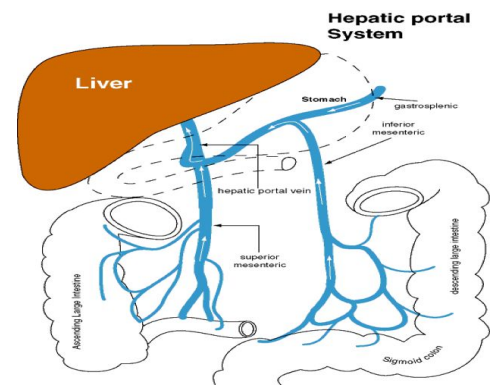
If colorectal liver Metastasis then the Resection is the cure. The other Metastasis if its more than 6 months we may consider resection, but if its less than 6 months we treat them with Palliative chemotherapy.

Portal Hypertension

[Highly recommended video!](#)

❖ Definition:

- Increased resistance to portal venous blood flow, the obstruction being pre-hepatic, hepatic or post-hepatic.
- Pressure (P) = Flow (F) X Resistance (R) , changes in either F or R affects the pressure.
- Portal pressure : 3 – 6 mm Hg
 - If PP > 10 : shunting.
 - If PP > 12: bleeding.
- Normal elevation:
 - Eating.
 - Exercise.
 - Valsalva.



- The most common cause of portal hypertension is liver cirrhosis, so portal hypertension has the same causes of liver cirrhosis.

❖ Pathophysiology:

- Liver disease :
 - ↓ portal vascular radius.
 - Splanchnic arteriolar vasodilation:
 - Decreased sensitivity to catecholamines.
 - Increased endogenous vasodilator (NO, prostacyclin).

❖ Mortality and morbidity:

- Variceal hemorrhage is the most common complication of PH:
 - 90% with cirrhosis develop varices.
 - 30% of these bleed.
 - The first episode is estimated to carry a mortality of 30-50%.

❖ Clinical features:

- Symptom:
 - Patients with cirrhosis frequently develop anorexia, generalized malaise and weight loss.
 - Hematemesis (due to upper GI bleeding) +/- melena.
 - Chronic liver disease symptom
- Examination:
 - Cirrhosis: hepatosplenomegaly, ascites, jaundice and spider naevi. Slurring of speech, flapping tremor or dysarthria may point to encephalopathy.
 - Serum bilirubin may be elevated and the serum albumin depressed, anemia may be present and the leukocyte count raised (or depressed if there's hypersplenism). Prothrombin time and other indices of clotting may be abnormal.
 - Hypotension, tachycardia.
 - Stigmata of liver disease.

❖ Assessment:

➤ Acute setting:

- ABC
- History
- If a patient came to the emergency with an upper GI bleeding in a form of hematemesis, after resuscitation and investigations, our next step after we put NGT and foley catheter is the **ENDOSCOPY**

➤ Elective setting:

- History of chronic liver disease
- Other differential diagnosis
- Stigmata of liver disease

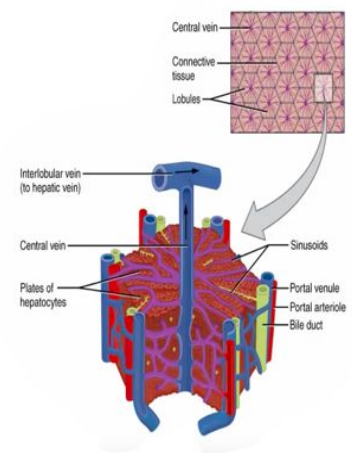
❖ Investigations:

Labs:

- Acute setting
 - CBC , LFTs, Albumin, PT/PTT, U&E, CXR
 - Cross match

Table 14.1 Causes of portal hypertension

Obstruction to portal flow:	
Prehepatic	<ul style="list-style-type: none"> • Congenital atresia of the portal vein • Portal vein thrombosis • Neonatal sepsis • Pyelophlebitis • Trauma • Tumour • Extrinsic compression of the portal vein • Pancreatic disease • Lymphadenopathy • Biliary tract tumours
Intrahepatic	<ul style="list-style-type: none"> • Cirrhosis • Schistosomiasis
Posthepatic	<ul style="list-style-type: none"> • Budd–Chiari syndrome • Constrictive pericarditis
Increased blood flow (rare)	<ul style="list-style-type: none"> • Arteriovenous fistula • Increased splenic blood flow in hypersplenism



- Chronic setting:
 - Hepatitis serology, ANA, Antimitochondrial antibodies, Alpha 1-antitrypsin deficiency.
- Radiology:
 - CXR
 - US, CT if the patient is a known case of cirrhosis the US and CT won't help that much, but if he wasn't we do US, CT maybe helpful if ultrasound isn't clear
- Endoscopy: the key investigation during an episode of active bleeding, this allows the detection of varices and defines whether they are or have been the site of bleeding.
- Hepatic venous pressure gradient. The only test that can give us the portal pressure reading, we use it only before the surgery to see if the patient have portal hypertension or not.

❖ **Child's grading system:** Patients with grade A have a good prognosis, whereas those in grade C have the worst prognosis. (need to know how to calculate score + grade)
MUST WATCH VIDEO!

Table 14.2 Assessment of patients with portal hypertension using a modification of Child's grading system			
Points scored			
Criterion	1	2	3
Encephalopathy	None	Minimal	Marked
Ascites	None	Slight	Moderate
Bilirubin ($\mu\text{mol/l}$)	< 35	35–50	> 50
Albumin (g/l)	> 35	28–35	< 28
Prothrombin ratio	< 1.4	1.4–2.0	> 2.0
Grade A = 5–6 points; grade B = 7–8 points; grade C = 10–15 points.			

❖ Treatment:

- **Endoscopy:**
 - Endoscopic variceal ligation (EVL) by application of a band. The most common procedure bc it has less complications and controls 80 -90% of bleeding.
 - Sclerotherapy (ethanolamine injection). It has the same rate control of bleeding but with more complication
- Pharmacology: if he doesn't improve with endoscopy
 - Octreotide.
 - Vasopressin.
- Balloon tamponade: if hemorrhage is torrential and prevents direct injection.
 - Four-lumen minnesota, which allows:
 - Aspiration of gastric contents.
 - Compression of the esophagogastric varices by the inflated gastric balloon.
 - Aspiration of the esophagus and pharynx to reduce pneumonic aspiration.
 - Balloon tamponade should not be left for more than 24-38 hours for the fear of causing esophageal necrosis.
 - Sengstaken–Blakemore tube.
- Transjugular intrahepatic portosystemic stent shunting (TIPSS):
 - A metal stent is inserted via the transjugular route using a guidewire passed through the hepatic vein to the intrahepatic branches of the portal vein. The technique is a relatively safe means of decompressing the portal system as general anesthesia and laparotomy are avoided.
 - Indications:
 - Uncontrolled variceal hemorrhage from esophageal, gastric, and intestinal varices that do not respond to endoscopic and medical management.

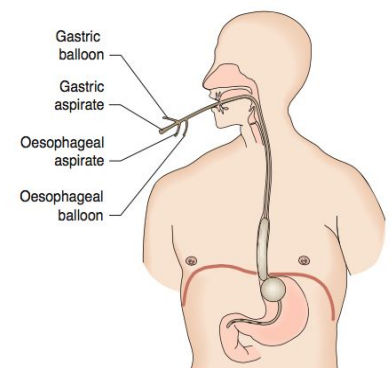


Fig. 14.9 Oesophageal tamponade using a Minnesota tube.

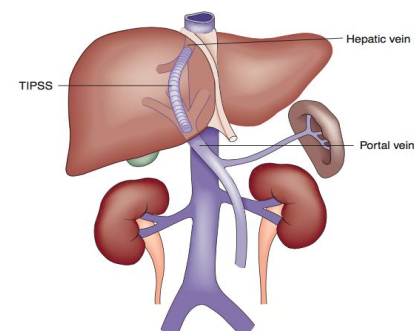
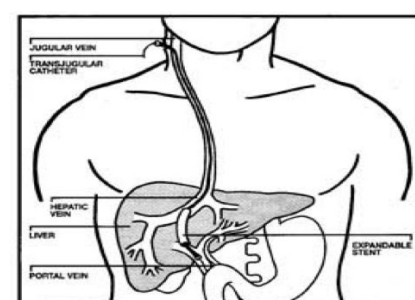


Fig. 14.11 Transjugular intrahepatic portosystemic stent shunting (TIPSS).





- Refractory ascites.
 - Hepatic pleural effusion (hydrothorax).
- Surgical: **If the patient doesn't improve or we don't have TIPSS**
 1. Shunt:
 - Selective.
 - Non-selective.
 2. Devascularization.

Recall:

What is the pathophysiology of portal hypertension?

Elevated portal pressure resulting from resistance to portal flow.

What is the etiology?

Cirrhosis (90%), schistosomiasis, hepatitis, Budd-Chiari syndrome, hemochromatosis, Wilson's disease, portal vein thrombosis, tumors, splenic vein thrombosis .

What are the associated CLINICAL findings in portal hypertension (4)?

1. Esophageal varices
2. Splenomegaly
3. Caput medusae (engorgement of paraumbilical veins)
4. Hemorrhoids.

What other physical findings are associated with cirrhosis and portal hypertension?

Spider angioma, palmar erythema, ascites, truncal obesity and peripheral wasting, encephalopathy, asterixis (liver ap), gynecomastia, jaundice

What are esophageal varices?

Engorgement of the esophageal venous plexuses secondary to increased collateral blood ow from the portal system as a result of portal hypertension

What are the signs/symptoms of esophageal varices?

Hematemesis, melena, hematochezia

What is the initial treatment of variceal bleeding?

As with all upper GI bleeding: large bore IVs 2, IV fluid, Foley catheter, type and cross blood, send labs, correct coagulopathy (vitamin K, fresh frozen plasma), intubation to protect from aspiration

What is the diagnostic test of choice?

EGD (upper GI endoscopy) Remember, bleeding is the result of varices only half the time; must rule out ulcers, gastritis, etc.

If esophageal varices cause bleeding, what are the EGD treatment options?

1. Emergent endoscopic sclerotherapy: a sclerosing substance is injected into the esophageal varices under direct endoscopic vision
2. Endoscopic band ligation: elastic band ligation of varices.

What are the pharmacologic options?

Somatostatin (Octreotide) or IV vasopressin (and nitroglycerin, to avoid MI) to achieve vasoconstriction of the mesenteric vessels; if bleeding continues, consider balloon (Sengstaken Blakemore tube) tamponade of the varices, beta-blocker

What are the options if sclerotherapy and conservative methods fail to stop the variceal bleeding or bleeding recurs?

- Repeat sclerotherapy/banding and treat conservatively
- TIPS
- Surgical shunt (selective or partial)
- Liver transplantation.

What does the acronym TIPS stand for?

Transjugular Intrahepatic Portosystemic Shunt

What is a TIPS procedure?

Angiographic radiologist places a small tube stent intrahepatically between the hepatic vein and a branch of the portal vein via a percutaneous jugular vein route

What is the most common perioperative cause of death following shunt procedure?

Hepatic failure, secondary to decreased blood ow (accounts for two thirds of deaths)

What is the major postoperative morbidity a er a shunt procedure?

Increased incidence of hepatic encephalopathy because of decreased portal blood ow to the liver and decreased clearance of toxins/metabolites from the blood

What medications are used to treat hepatic encephalopathy?

Lactulose PO, with or without neomycin PO

What is a right hepatic lobectomy?

Removal of the right lobe of the liver (i.e., all tissue to the right of Cantlie's line is removed)

What is left hepatic lobectomy?

Removal of the left lobe of the liver (i.e., removal of all the liver tissue to the left of Cantlie's line)

What is a right trisegmentectomy?

Removal of all the liver tissue to the right of the falciform ligament

What is the most common liver cancer?

Metastatic disease outnumbers primary tumors 20:1; primary site is usually the GI tract

What lab tests comprise the workup for liver metastasis?

LFTs (AST and alkaline phosphatase are most useful), CEA for suspected primary colon cancer

What are the associated imaging studies?

CT scan, ultrasound, A-gram

What are the three common types of primary benign liver tumors?

1. Hemangioma (**the most common**) 2. Hepatocellular adenoma 3. Focal nodular hyperplasia

What are the four common types of primary malignant liver tumors?

1. Hepatocellular carcinoma (hepatoma) **the most common**
2. Cholangiocarcinoma (when intrahepatic)
3. Angiosarcoma (associated with chemical exposure)
4. Hepatoblastoma (most common in infants and children)

What are the other benign liver masses?

Benign liver cyst, bile duct hamartomas, bile duct adenoma

What is Hepatocellular Carcinoma?

Most common primary malignancy of the liver **also known as?** Hepatoma

What is its incidence?

Accounts for 80% of all primary malignant liver tumors

What are the signs/ symptoms?

Dull RUQ pain, hepatomegaly (classic presentation: painful hepatomegaly), abdominal mass, weight loss, paraneoplastic syndromes, signs of portal hypertension, ascites, jaundice, fever, anemia, splenomegaly

What tests should be ordered?

Ultrasound, CT scan, angiography, tumor marker elevation

What is the tumor marker?

Elevated -fetoprotein

What is the most common site of metastasis?

Lungs

What is the treatment of hepatocellular carcinoma?

Surgical resection, if possible (e.g., lobectomy); liver transplant

What are the indications for liver transplantation?

Cirrhosis and NO resection candidacy as well as no distant or lymph node metastases and no vascular invasion; the tumor must be single, 5-cm tumor or have three nodules, with none 3 cm

[Summary \(link\)](#)



Questions

1) The most common benign tumors in the liver are:

- A- Cavernous haemangiomas.
- B- Adenomas.
- C- Focal nodular hyperplasia.
- D- Cholangiocarcinoma.

2) A patient known to have hepatitis C for 20 years came with hematemesis, which of the following is the first step in management of this patient?

- A- Give him octreotide.
- B- Endoscopic variceal ligation.
- C- Give him IV fluid if unstable.
- D- Do endoscopy.

3) Mostafa has a history of infection of biliary tree by *Clonorchis sinensis* (parasite) 10 years ago, which of the following cancer has the greatest chance of occurrence?

- A- Cholangiocarcinoma.
- B- Hepatoma.
- C- Adenoma.
- D- Focal nodular hyperplasia.

4) Portal hypertension is high risk of bleeding when pressure is:

- A- >6 mmHg
- B- >12 mmHg
- C- >11 mmHg
- D- >10 mmHg

5) What is the most common complication of portal hypertension?

- A- Ascites.
- B- PHT.
- C- Esophageal Varices.
- D- Splenomegaly.

6) We determine if a patient with hepatoma needs liver transplantation or not depending on which criteria?


- A- Milan.
- B- Child.
- C- Ranson.
- D- Light.

7) Which of the following is the most effective therapy for acute hematemesis due to Esophageal Varices?

- A- Endoscopic variceal ligation .
- B- Sclerotherapy.
- C- Octreotide.
- D- Minnesota.

8) Which of the following is the most effective therapy for refractory hematemesis due to Esophageal Varices?

- A- Sclerotherapy.
- B- Vasopressin.



C- Sengstaken-blakemore tube.

D- Minnesota.

9) Which of the following test is first line test to diagnose Hydatid disease?

A- Immunoelectrophoresis.

B- CBC.

C- Enzyme linked immunosorbent assay.

D- Immunoblotting.

1-A 2-C 3-A 4-B 5-C 6-A 7-A 8-D 9-D