LIVER, SPLEEN & PORTAL SYSTEM

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TOPICS

- Liver
- Spleen
- Portal System
The largest visceral structure in the abdominal cavity. It is an accessory organ of the gastrointestinal located in the right upper quadrant of the abdomen. It is completely surrounded by fibrous capsule and partially covered by peritoneum.
INTRODUCTION

- It is an accessory organ of the gastrointestinal located in the right upper quadrant of the abdomen.

- The largest visceral structure in the abdominal cavity.

- Its posteroinferior (visceral) surface lies in contact with the esophagus, the stomach, the duodenum, the right colic flexure, right kidney, suprarenal gland, and the gallbladder.

- It is completely surrounded by fibrous capsule and partially covered by peritoneum.
FUNCTIONS

- Production & Secretion of bile.
- Metabolism of carbohydrates, lipids and proteins.
- Filtration of the venous blood from the intestinal tract.
- Synthesis of heparin.
- Detoxication to removal toxic.
- Production pf bile pigments from hemoglobin.
- Storage for some vitamins like K & B12.
**RELATIONS**

- **Anterior**
  - Diaphragm
  - Right and left costal margins
  - Lower margins of both lungs
  - Anterior abdominal wall at subcostal angle

- **Posterior**
  - Diaphragm
  - Right kidney
  - Hepatic flexure of colon
  - Duodenum
  - Gallbladder,
  - IVC
  - Esophagus
  - Stomach fundus
The liver is divided by falciform ligament into:
- A large right lobe
- A small left lobe
- The right lobe is further divided into:
  - Quadrate lobe
  - Caudate lobe
    - the gallbladder
    - the fissure for ligamentum teres
    - the IVC and
    - the fissure for ligamentum venosum.
The diaphragmatic surface
- Refers to the anterosuperior surface of the liver.
- It is smooth and convex, fitting snugly beneath the curvature of the diaphragm.
- A section of this surface is not covered by visceral peritoneum, known as the ‘bare area’ of the liver.

The visceral surface
- Covers the posteroinferior aspect of the liver.
- It is moulded by the shape of the surrounding organs, making it irregular and flat.
- It lies in contact with the oesophagus, right kidney, right adrenal gland, right colic flexure, duodenum, gallbladder and the stomach.
The Porta Hepatis (Hilum) of the liver lies between the right and left lobe on the posteroinferior surface.

The lesser omentum is attached to its edge.

Within, lie the right and left hepatic ducts, the right and left branches of the hepatic artery, the portal vein, sympathetic and parasympathetic nerve fibers and some lymph nodes.
BLOOD SUPPLY

- **Arteries**
  - The hepatic artery, branch of the celiac artery, divides into right and left terminal branches at porta hepatitis.

- **Veins**
  - The portal vein divides into right and left terminal branches that enter porta hepatis behind the arteries.
  - The hepatic veins (3 or more) emerge from the posterior surface of the liver and drain into the IVC.

- **Blood Circulation**
  - The hepatic artery brings 30% of the blood to the liver, and 70% comes from the portal vein.
The liver produces approximately 30 to 50% of the total body lymph.

- The liver lymph vessels are drained in lymph nodes in the region of porta hepatis.
- The efferent lymph vessels are drained mainly to the celiac lymph nodes.
The sympathetic and parasympathetic innervation comes from the celiac plexus.

The anterior vagal trunk gives rise to a large hepatic branch which passes directly to the liver.
Cirrhosis is a chronic disease in which the liver slowly deteriorates, with scar tissue replacing healthy liver tissue and partially blocking the flow of blood through the liver.

This reduced blood flow affects the way the liver performs its functions.

Excessive alcohol consumption and chronic hepatitis B and C are the most common causes of cirrhosis.

Other conditions such as fatty liver disease associated with obesity, blocked bile ducts and haemochromatosis also cause cirrhosis.

Cirrhosis cannot be cured so treatment aims to prevent the disease from progressing.

Treatment will include avoidance of alcohol and other drugs, nutrition therapy and medications to treat specific complications or causes of the disease.
Hepatitis is an inflammation of the liver that can result in damage to the cells in the liver.

- It can lead to cirrhosis or cancer of the liver.
- Patients with hepatitis will have symptoms that include hepatomegaly, jaundice, clay-colored faeces, dark urine, abnormal liver function tests and generalised malaise.
- There are at least five viruses that cause different types of hepatitis.
- They are called hepatitis A, B, C, D and E.
- They all result in similar symptoms but differ in the way in which they are transmitted.
LIVER BIOPSY

- It is a procedure used to obtain a sample of liver tissue.
- A needle is inserted through the skin to access the liver.
- The biopsy is required in several clinical scenarios:
  - Abnormal LFTs (Liver Function Test) of unknown cause.
  - Hepatitis C to assess the severity of liver fibrosis and disease progression.
  - Other liver conditions.
  - Following liver transplantation.
The spleen is oval-shaped and has a notched anterior border. It is reddish color, and it is the biggest lymphoid organ in the body. It lies beneath the left coupole of the diaphragm close to the 9th, 10th and 11th ribs.
• It is blood-filled organ which lies in the LUQ of the abdomen lateral to the stomach.
• All blood cells pass through the spleen, which identifies those cells which are too old or abnormal and destroys them through the activity of its lymphocytes.
• White blood cells in the spleen act to trap pathogens.
• The spleen is also able to supply blood when needed by the body, such as when a haemorrhage occurs.
• In enlargement of the spleen, the superior border moves inferomedially, and its notches can be palpated.
STRUCTURE

- The spleen is oval-shaped and has a notched anterior border.
- It is reddish color, and it is the biggest lymphoid organ in the body.
- It lies beneath the left coupole of the diaphragm close to the 9th, 10th, and 11th ribs.
- It is long axis lies along the shaft of the 10th rib and it is lower pole extends to the midaxillary line.
FUNCTIONS

- Site of lymphocyte proliferation.
- Immune monitoring and response.
- Cleanses the blood.
- Stores breakdown products of RBCs for later reuse.
  - Spleen macrophages salvage and store iron for later use by bone marrow.
- Site of fetal erythrocyte production (normally ceases after birth).
- Stores blood platelets.
**RELATIONS**

- **Anterior**
  - the stomach.
  - tail of pancreas.
  - left colic flexure.
  - left kidney lies along its medial border.

- **Posterior**
  - the diaphragm.
  - left pleura.
  - left costodiaphragmatic recess.
  - left lung.
  - 9th, 10th and 11th ribs.
**BLOOD SUPPLY**

- **Splenic Artery**
  - The biggest branch of the celiac artery.
  - It has a tortuous course and runs along the superior border of the pancreas.
  - Before entering the spleen at the hilum, it divides into 6 branches.

- **Splenic Vein**
  - The Splenic vein leaves the hilum and runs behind the body of the pancreas.
  - Behind the neck of the pancreas, it joins the superior mesenteric vein to form the portal vein.
The lymph vessels emerge from the hilum and pass through a few lymph nodes (pancreaticosplenic nodes) along the course of the Splenic artery and then drain into the celiac nodes.
The nerves accompany the **spleenic artery** and are derived from the **celiac plexus**.
Disorders include **splenomegaly**, where the spleen is enlarged for various reasons, such as cancer and **asplenia**, where the spleen is not present or functions abnormally.
The portal system is about 5 cm long and is formed behind the neck of the pancreas by the union of the superior mesenteric vein and the splenic vein. It ascends to the right, behind the 1st part of the duodenum and enters the lesser omentum.
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- It ascends to the right, behind the 1st part of the duodenum and enters the lesser omentum.
- It then runs upward in front of the opening of the lesser sac to the porta hepatis, where it divides into right and left terminal branches.
Before it enters the lesser omentum, it is crossed anteriorly by the hepatic artery; it then lies behind and to the left of the common bile duct and behind the proper hepatic artery.
TRIBUTARIES

- **Splenic Vein**
  - short gastric
  - left gastroepiploic
  - inferior mediastinal
  - pancreatic veins

- **Inferior Mesenteric Vein**
  - superior rectal veins
  - sigmoid veins
  - left coic veins

- **Superior Mesenteric Vein**
  - Jejunal and ileal
  - ileocolic
  - right and middle colic
  - right gastroepiploic veins
TRIBUTARIES

- **Left Gastric Vein**
  - This vein drains the left part of the lesser curvature of the stomach and the distal part of the esophagus. It opens directly into the portal vein.

- **Right Gastric Vein**
  - This vein drains the right part of the lesser curvature of the stomach and drains directly into the portal vein.

- **Cystic Vein**
  - These veins drain the gallbladder directly into the liver or join the portal vein.
Portal hypertension is the increase in blood pressure in the veins of the portal system.

It is caused by blockage in the veins of the liver due to pathological conditions such as liver cirrhosis and the inability of the blood to flow through.

Signs and symptoms are varicose veins on the abdominal wall called caput medusae, oesophageal varices, enlargement of the spleen, accumulation of fluid in the peritoneal cavity and bleeding in the gastrointestinal tract.
PORTO-SYSTEMIC ANASTOMOSIS

- **Porto-Systemic anastomosis** (portocaval anastomosis) is the collateral communication between the portal and the systemic venous system.
- It occurs between the veins of portal circulation and those of systemic circulation.
- The importance of portosystemic anastomoses is to provide alternative routes of circulation when there is a blockage in the liver or portal vein.
- These routes ensure that venous blood from the gastrointestinal tract still reaches the heart through the inferior vena cava without going through the liver.

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QUESTIONS?

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