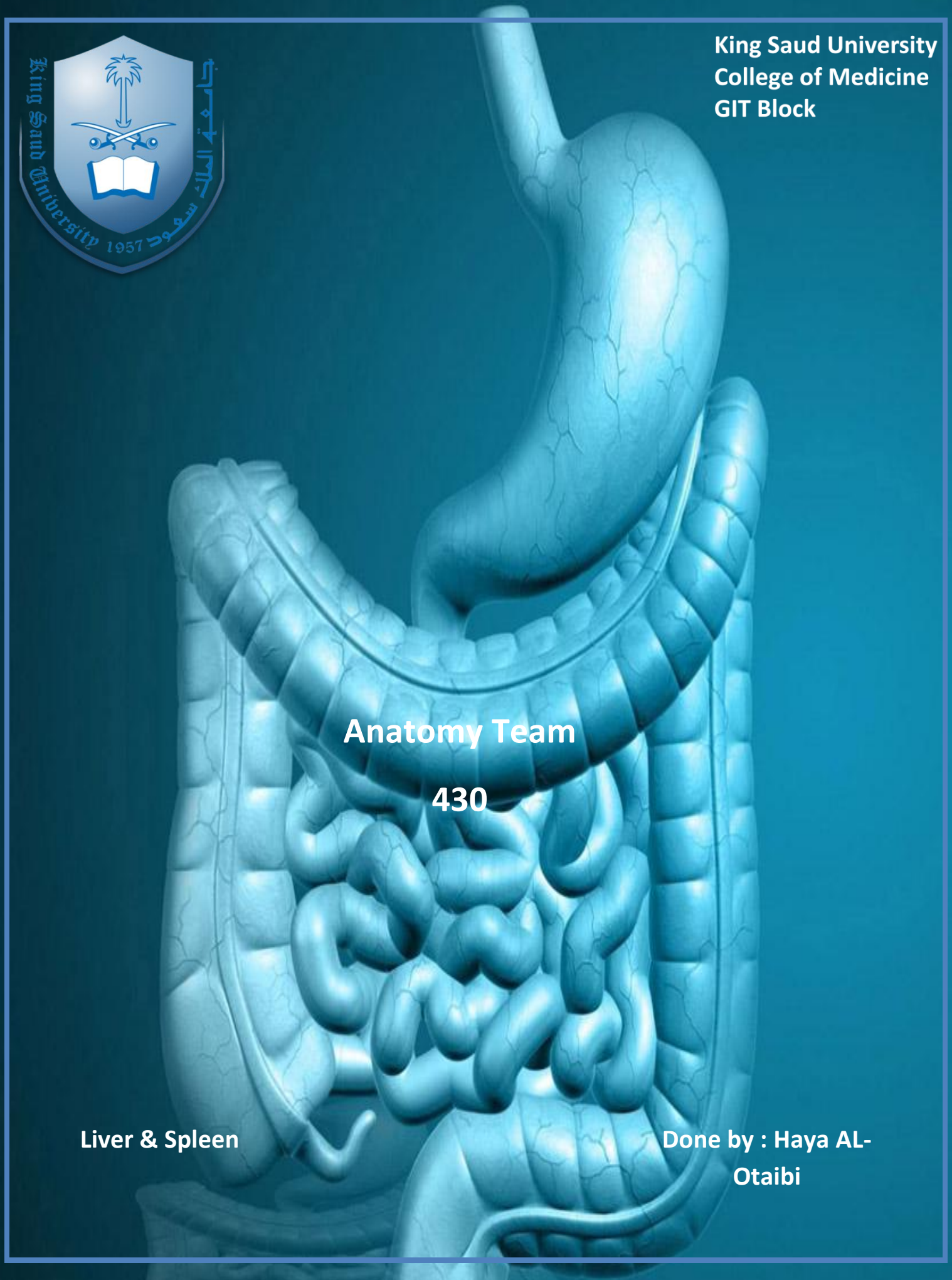


King Saud University
College of Medicine
GIT Block

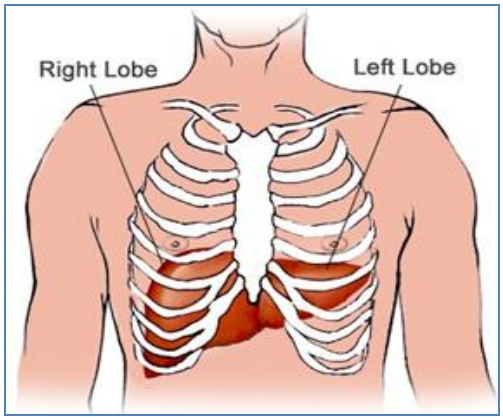
Anatomy Team

430

Liver & Spleen

Done by : Haya AL-Otaibi

Liver:



A- General Characteristic features:

- ✓ **The largest gland in the body**
- ✓ **Weighs approximately 1500 g (approximately 2.5% of adult body weight).**

B- Surface anatomy : " important"

- ✓ **Lies mainly in the right hypochondrium and epigastrium and extends into the left hypochondrium.**
- ✓ **Protected by the :**
  1- thoracic cage.
  2- diaphragm.
- ✓ **lies deep to ribs 7-11 on the right side and crosses the midline toward the left nipple.**
- ✓ **Moves with the diaphragm and is located more inferiorly when one is erect because of gravity.**

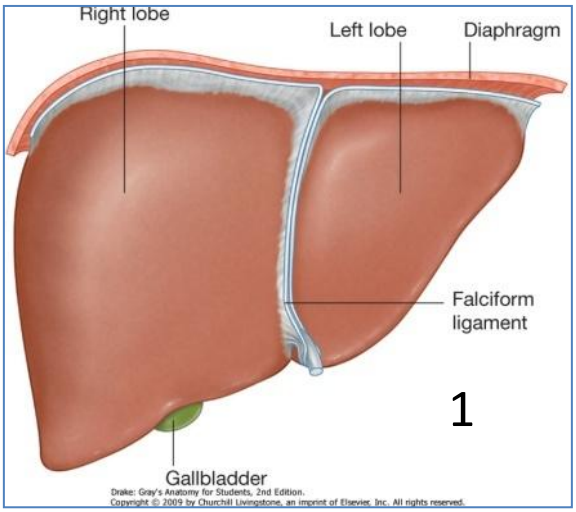
C- Relations :-

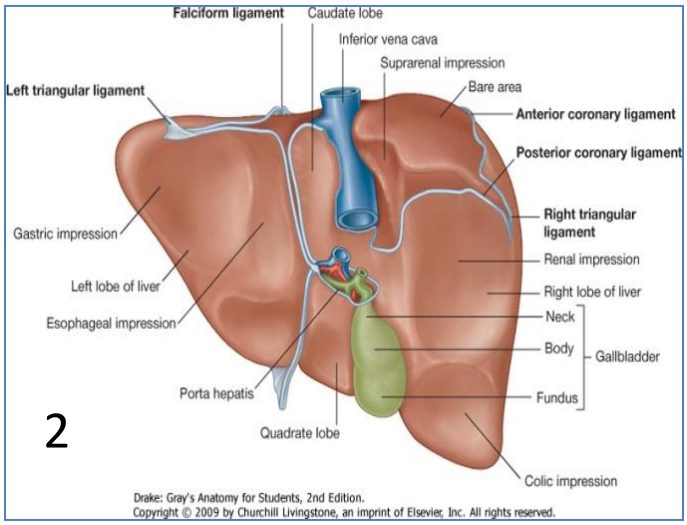
Anteriorly	Posteriorly
Diaphragm	Diaphragm
right and left costal margins	right kidney
right and left pleura	hepatic flexure of the colon,
lower margins of both lungs	Esophagus
xiphoid process	fundus of the stomach
anterior abdominal wall in the	Duodenum
subcostal angle	Gall bladder
	inferior vena cava

-Surfaces of the liver:

The liver has two surfaces:

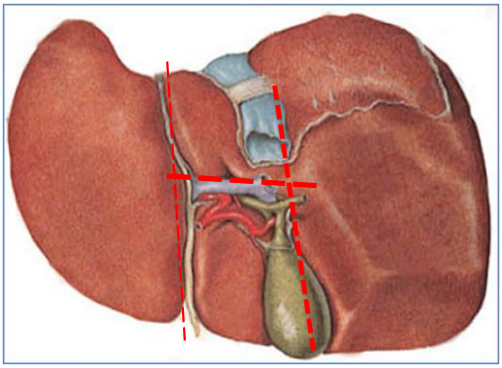
1- **A convex diaphragmatic surface**
2- **A relatively flat or even concave visceral surface (posteroinferior)**





Diaphragmatic surface	Visceral Surface
The convex upper surface is smooth	It bears multiple fissures and impressions from contact with other organs.
molded to the undersurface of the domes of the diaphragm which separates it from the pleurae, lungs, pericardium, and heart	Two sagittally oriented fissures, linked centrally by the transverse porta hepatis, form the letter H on the visceral surface
Covered with visceral peritoneum, except posteriorly in the bare area of the liver, where it lies in direct contact with the diaphragm	is covered with peritoneum, except at the fossa for the gallbladder and the porta hepatis

-Fissures & Impressions :-

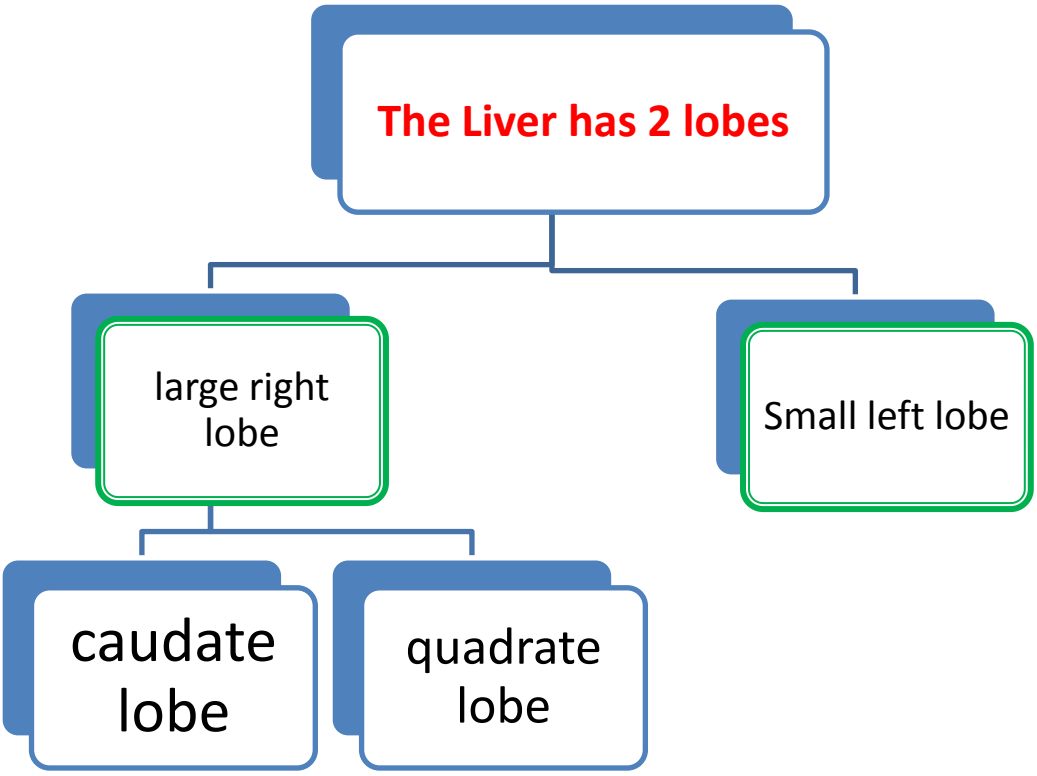


left fissure	Right fissure
is the continuous groove formed by : 1- anteriorly by the fissure for the round ligament. 2- posteriorly by the fissure for the ligamentum venosum.	is the continuous groove formed: 1- anteriorly by the fossa for the gallbladder. 2- 2-posteriorly by the groove for the vena cava.

-The visceral surface is related to the:

1. stomach and duodenum.
2. Esophagus.
3. lesser omentum.
4. Gallbladder.
5. right colic flexure.
6. right kidney and right suprarenal gland.

-Lobes of the liver :-



- **The attachment of the peritoneum of the falciform ligament divided the liver into:**
  - ✓ **1- a large right lobe**
  - ✓ **2- small left lobe**
- **The right lobe is further divided anatomically into 2 lobes by the presence of the gallbladder, the fissure for the ligamentum teres, the inferior vena cava, and the fissure for the ligamentum venosum. :**
  - **1- a quadrate lobe**
  - **2- caudate lobe.**
- **In fact, the quadrate and caudate lobes are a functional part of the left lobe of the liver.**

✓ **The caudate lobe is connected to the right lobe by the caudate process .**

-Porta Hepatis (Hilum of the Liver) :-

- **What is porta Hepatis ?**

✓ **It is a transverse fissure found on the posteroinferior surface and lies between the caudate and quadrate lobes.**

✓ **The upper part of the free edge of the lesser omentum is attached to its margins.**

- **Structures passing through the porta hepatis include:**

1. **right and left <u>hepatic</u> ducts**
2. **right and left branches of the <u>hepatic</u> artery**
3. **right and left branches of the <u>portal</u> vein**
4. **sympathetic and parasympathetic nerve fibers**
5. **a few hepatic lymph nodes , they drain the liver and gallbladder and send their efferent vessels to the celiac lymph nodes.**

-Peritoneal Ligaments :-

- **Liver contains 5 ligaments :**

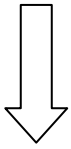
1- **The falciform ligament.**
2- **ligamentum teres of liver.**
3- **Anterior and posterior coronary ligaments.**
4- **right and left triangular ligaments.**
5- **ligamentum venosum.**

- **Their course and origin " important" :**

1-The falciform ligament is a two-layered fold of the peritoneum ,ascends from the umbilicus to the liver.

- **It has a sickle-shaped free margin that contains:**
- **the ligamentum teres or the "round ligament " is the fibrous remnant of the umbilical vein, which carried well-oxygenated and nutrient-rich blood from the placenta to the fetus. The round ligament and small paraumbilical veins course in the free edge of the falciform ligament.**

Then



- **The falciform ligament passes on to the anterior and then the superior surfaces of the liver and then splits into two layers:-**

  - ✓ **The right layer forms the upper layer of the right coronary ligament**
  - ✓ **the left layer forms the upper layer of the left triangular ligament.**

- **The right & left extremities of the coronary ligaments form the the right & left triangular ligaments of the liver.**

- ✓ The ligamentum venosum is the fibrous remnant of the fetal ductus venosus, which shunted blood from the umbilical vein to the IVC, short-circuiting the liver.

- ✓ The peritoneal layers forming the coronary ligaments are widely separated, leaving an area of liver devoid of peritoneum (The bare area of the liver)

- Peritoneal reflection :-

- The liver is completely surrounded by a fibrous capsule but only partially covered by peritoneum.
- The bare area of the liver is a part of the liver on the diaphragmatic surface where there is no intervening peritoneum between the liver and the diaphragm.
- The anterior boundary of the bare area is indicated by a reflection of peritoneum(the anterior coronary ligament).

- The posterior boundary of the bare area is indicated by a reflection of peritoneum(the posterior coronary ligament).

- Where the coronary ligaments come together laterally, they form the right and left triangular ligaments

-Blood circulation through the liver :-

- **The blood vessels conveying blood to the liver are:**
- **1- the hepatic artery (30%) .**
- **2- portal vein (70%) " Majority " .**

Hepatic artery	Portal vein
brings oxygenated blood to the liver.	brings venous blood rich in the products of digestion, which have been absorbed from the gastrointestinal tract.
It is a branch of the celiac artery, divides into right and left terminal branches that enter the porta hepatis.	

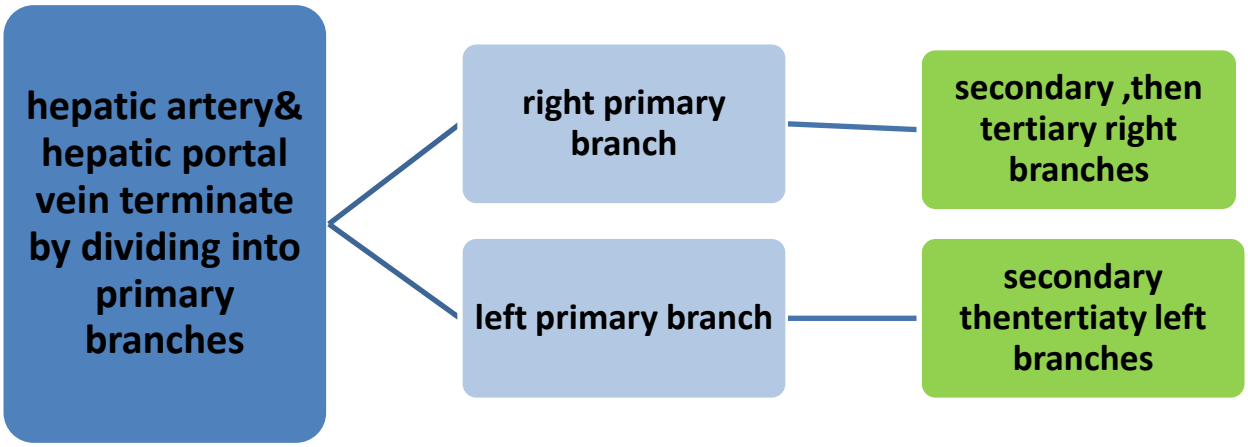
-Courses and their branches :

- At or close to the porta hepatis :

✓ the hepatic artery and hepatic portal vein terminate by dividing into:

- right and left branches :-
  these primary branches supply the right and left parts, respectively.

✓ Within the right and left parts, the simultaneous secondary and tertiary branching occurs to supply independently the hepatic segments.



- ✓ **The hepatic veins, are intersegmental (draining parts of adjacent segments) in their distribution and function.**
- ✓ **The hepatic veins, open into the Inferior vena cava just inferior to the diaphragm.**
- ✓ **The attachment of these veins to the IVC helps hold the liver in position. " major role "**
- ✓ **The peritoneal ligaments and the tone of the abdominal muscles play a minor role in the support of liver.**

-Lymph Drainage :-

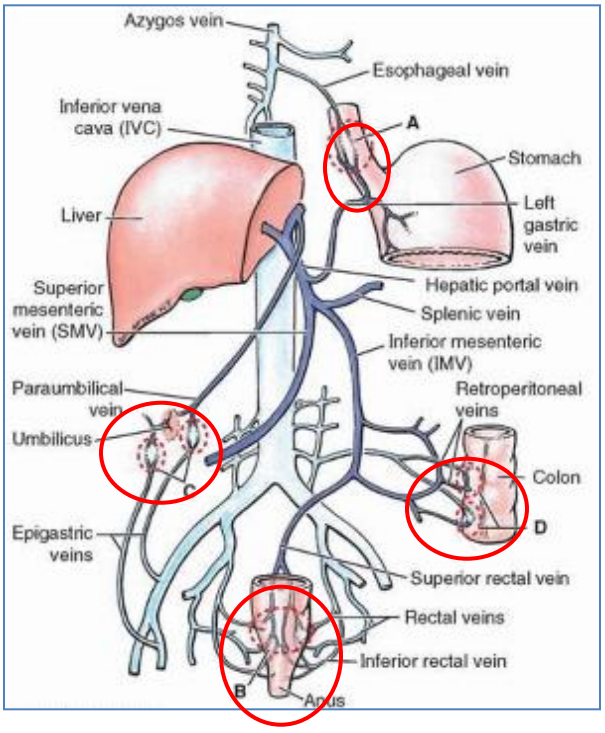
- ✓ **The liver produces a large amount of lymph—about one third to one half of all body lymph.**
- ✓ **The lymph vessels leave the liver and enter several lymph nodes in the porta hepatis.**
- ✓ **The efferent vessels pass to the celiac nodes.**
- ✓ **A few vessels pass from the bare area of the liver through the diaphragm to the posterior mediastinal lymph nodes.**

-Nerve supply :-

- ✓ **Sympathetic and parasympathetic nerves from the celiac plexus reach the liver via the hepatic plexus.**
- ✓ **The anterior vagal trunk gives rise to a large hepatic branch, which passes directly to the liver.**

-Clinical Notes :-

- **Liver Supports and surgery:-**
  - ✓ **The liver is held in by the attachment of the hepatic veins to the IVC the peritoneal ligaments & the tone of the abdominal muscles.**
  - ✓ **If the peritoneal ligaments are cut, the liver can be only slightly rotated.**
- **Hepatic portal vein and portal-systemic anastomoses:-**
  - ✓ **Portal venous system communicates with the systemic venous system.**
  - ✓ **Also, esophagus, anal canal, in the paraumbilical region, and colon .**



Spleen :-

- **characteristics and surface anatomy of the spleen :**

✓ **Largest single mass of lymphoid tissue, Ovoid in shape with notched anterior border.**

✓ **Located in the left hypochondrium, deep to 9, 10 & 11 ribs.**

✓ **Long axis lies along the shaft of the 10^{th} rib and separated from them by the diaphragm and the costodiaphragmatic recess**

✓ **Lower pole extends forward as far as the midaxillary line.**

✓ **Normal size spleen cannot be palpated on clinical examination.**

-Surfaces:

1- Diaphragmatic surface: convexly curved to fit the concavity of the diaphragm and curved bodies of the adjacent ribs

2- Visceral surface.

-Borders:

✓ **The anterior and superior borders of the spleen are sharp and often notched.**

✓ **whereas its posterior (medial) end and inferior border are rounded.**

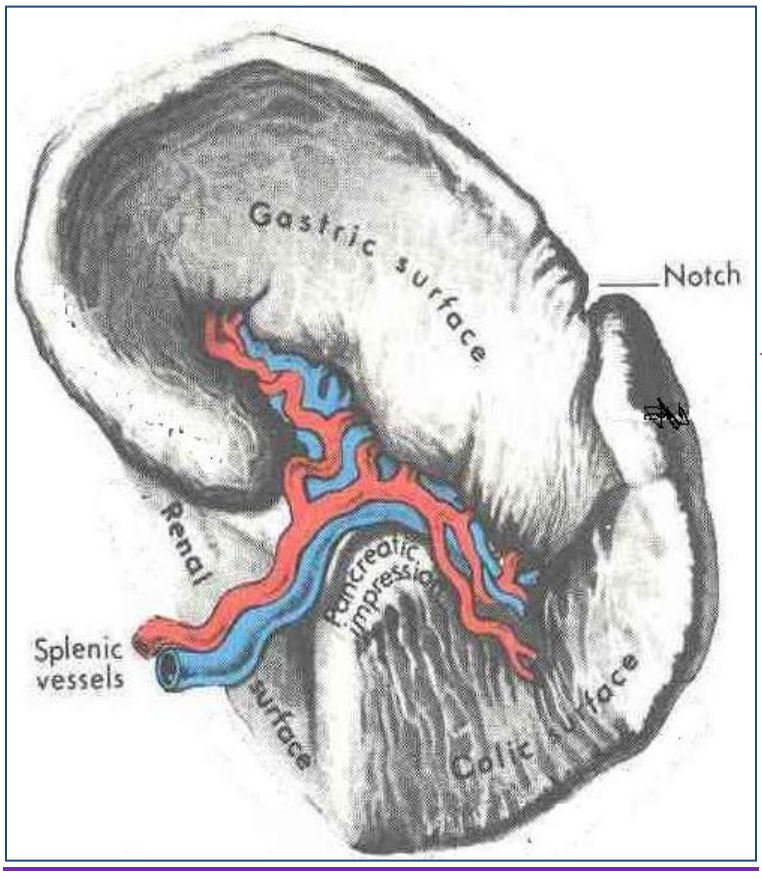
-Peritoneal reflections and ligaments :-

✓ **Spleen is completely surrounded by peritoneum which passes from it at the hilus as:**

Gastrosplenic ligament to the greater curvature of stomach (carrying the short gastric and left gastroepiploic vessels)	**Lienorenal ligament to the left kidney (carrying the splenic vessels and the tail of pancreas) very important ****

-Relations of the spleen :-

Anteriorly	Posteriorly	Inferiorly	Medially
Stomach, tail of pancreas, left colic flexure & left kidney. " Gastric surface"	Diaphragm, that separates it from the left pleura (left costo-diaphragmatic recess), left lung & (9, 10 & 11 ribs)	Left colic flexure. " Colic surface"	Left kidney " renal surface"



Very important picture which shows the relations of the spleen .

-Arterial Supply :-

- ✓ **Splenic artery:**
  - ✓ **Largest branch of the celiac artery.**
  - ✓ **Runs a tortuous course along the upper border of the pancreas.**
  - ✓ **Passes within the lienorenal ligament.**
  - ✓ **Divides into 4-5 branches, which enter the spleen at the hilus .**
  - ✓ **The lack of anastomosis of these arterial vessels within the spleen results in the formation of vascular segments of the spleen with relatively avascular planes between them, enabling subtotal splenectomy .**

-Venous Drainage :-

- **Splenic vein:**

✓ **Leaves the hilus.**

✓ **Runs behind the tail & body of the pancreas.**

✓ **Reaches behind the neck of pancreas, where it joins the superior mesenteric vein to form the portal vein** very important .**

- **Tributaries:**

1. **Short gastric vein.**
2. **left gastroepiploic vein.**
3. **Pancreatic veins.**
4. **Inferior mesenteric vein.**

-Lymphatic Drainage :-

- ✓ **Lymphatics emerge from the hilus and drain into several nodes lying at the hilum.**
- ✓ **Efferents from the hilar nodes pass along the course of splenic artery, and drain into the celiac lymph nodes.**

-Nerve Supply :-

- ✓ **The nerves of the spleen, derived from the celiac plexus, are distributed mainly along branches of the splenic artery, and are vasomotor in function.**

-Clinical Notes :-

- ✓ **Normally the spleen does not extend inferior to the left costal margin; thus it is seldom palpable through the anterolateral abdominal wall unless it is enlarged.**
- ✓ **The spleen must be at least double its normal size before its anterior border passes beyond the left costal margin.**
- ✓ **A palpable spleen is identified by the notch in its anterior.**
- ✓ **A pathologically enlarged spleen extends downward and medially toward the right iliac fossa.**
- ✓ **Portal hypertension results in enlargement of spleen due to venous congestion.**
- ✓ **Laceration of spleen may occur in automobile accidents. It is in danger from trauma to the left lower rib cage, particularly ribs 9, 10 & 11. A ruptured spleen may cause fatal hemorrhage.**