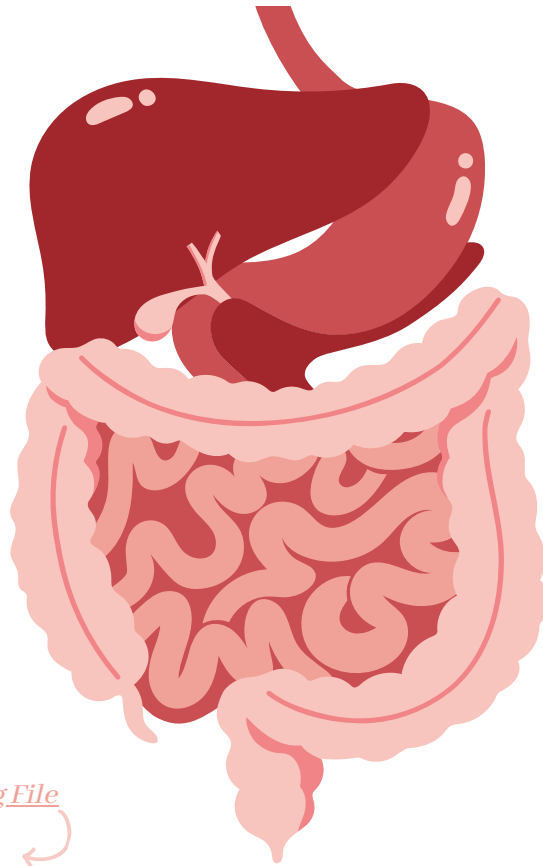




# Anatomy of the Liver & Spleen

GNT Block



## Color Index

- ◆ Main Text
- ◆ Female Slides
- ◆ Male Slides
- ◆ Drs' Notes
- ◆ Important
- ◆ Extra info

[The Editing File](#)



# Objectives



Location, subdivisions, relations and peritoneal reflection of liver.



Blood supply, nerve supply and lymphatic drainage of liver.



Porto-systemic anastomosis.



Location, subdivisions and relations and peritoneal reflection of spleen.



Blood supply, nerve supply and lymphatic drainage of spleen.

This lecture was presented by :

Dr. Khaleel Alyahya

Dr. Sanaa Al-Shaarawi



#### IMPORTANT NOTE!!

according to the Male's doctor the important points are in Female slides, the extra info in male's slides are just for knowledge.



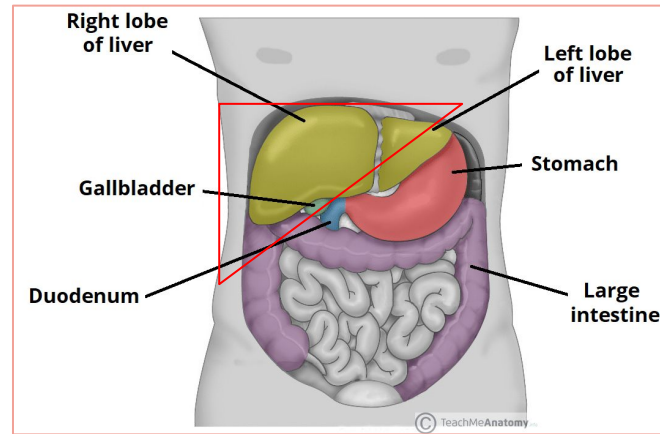
You can find Atlas by [Clicking HERE!](#)

# Introduction to the Liver



Introduction to the liver

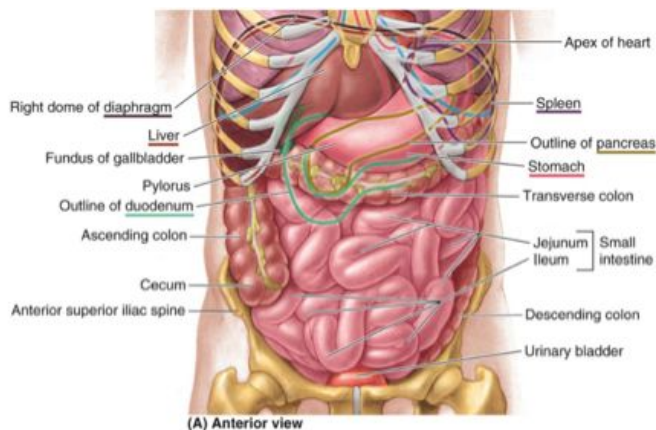
- ▶ The **largest gland** in the body.
- ▶ Weighs approximately 1500 g (approximately 2.5% of adult body weight).
- ▶ Lies mainly in the **right hypochondrium** and **epigastrium** and extends into the left hypochondrium.
- ▶ Protected by the **thoracic cage and diaphragm**, its greater part lies **deep to ribs 7-11 on the right side** and crosses the midline toward the left below the nipple.



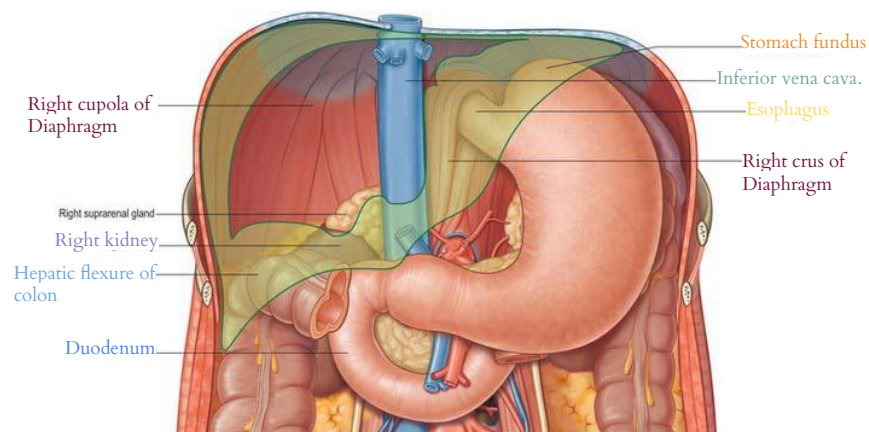
## Relations of Liver

Dr. Khaleel: The relations are **IMPORTANT**

Anterior	Posterior
Diaphragm	Diaphragm
Lower right and left pleura.	Right kidney.
Lower margins of both lungs.	Hepatic flexure of colon.
Right and left costal margins.	Duodenum
Xiphoid process.	Gallbladder
Anterior abdominal wall in the subcostal angle.	Inferior vena cava.
	Esophagus & Stomach fundus.



(A) Anterior view

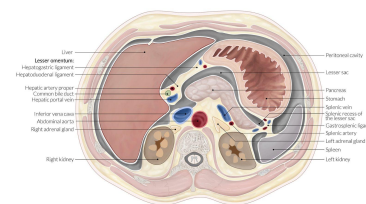


# Peritoneal Reflection & Ligament

Peritoneal Reflection

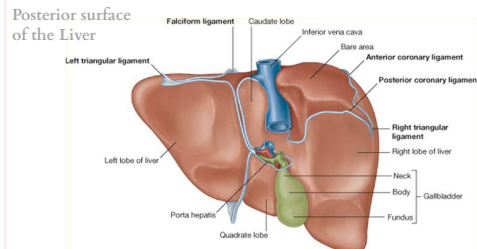
❖ **Peritoneum :**

The liver is surrounded by a fibrous capsule and completely covered by peritoneum (except the bare areas).



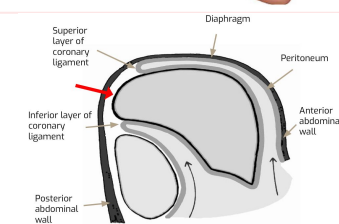
❖ **Bare area :**

The bare area of the liver is triangular area on the posterior surface of right lobe where there is no intervening peritoneum between the liver and the diaphragm.



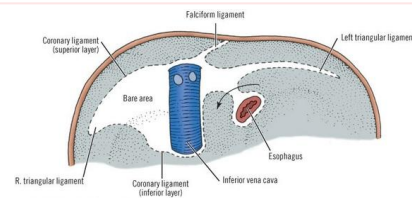
❖ **Boundaries of Bare area:**

- ❖ Anterior: superior layer of coronary ligament.
- ❖ Posterior: inferior layer of coronary ligament.
- ❖ Laterally: right and left triangular ligaments



**Other bare areas include :**

- ❖ porta hepatis
- ❖ fossa for gallbladder
- ❖ groove for IVC



Dr. Khaleel: The Falciform ligament is Imp. especially in OSPE

## Ligaments Of The Liver

### Falciform ligament

It is a two-layered fold of the peritoneum. It connects the liver with the diaphragm and anterior abdominal wall & umbilicus.

Its sickle-shaped free margin contains:

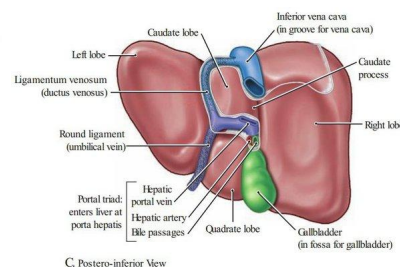
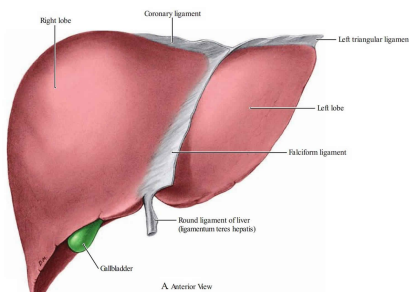
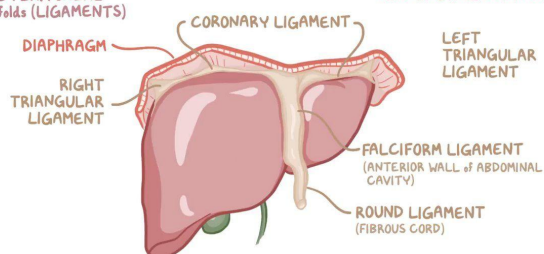
- The **ligamentum teres (round Ligament)** of liver.
- The **remains of the umbilical vein** (obliterated umbilical vein), which carries oxygenated blood from the placenta to the fetus.

### Ligamentum venosum

It is the fibrous remnant of the fetal ductus venosus (obliterated ductus venosus)

Which shunted blood from the umbilical vein to the left branch of portal vein and to the IVC.

**LIVER** ~ COVERED by a SEROUS MEMBRANE (VISCERAL PERITONEUM)  
\* 5 PERITONEAL folds (LIGAMENTS) - SUSPENDS the LIVER from ABDOMINAL WALL & DIAPHRAGM

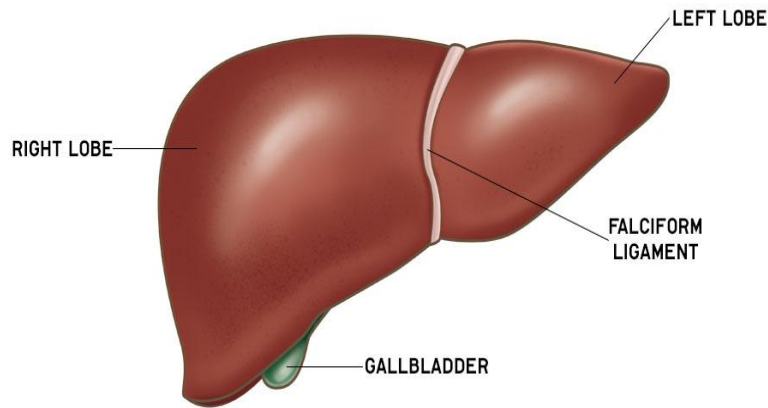


# Surface of liver

MCQ

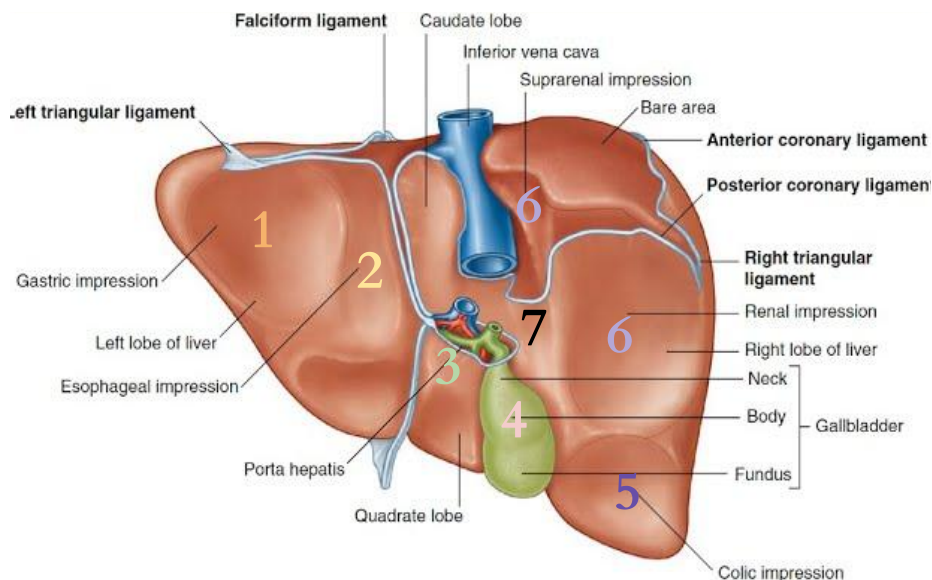
The liver has two surfaces :

## Convex Diaphragmatic Surface (Antero-Superior)



- The convex upper surface is smooth and molded to the undersurface of the domes of the diaphragm which separates it from the pleurae, lungs, pericardium and the heart.
- Covered with **visceral peritoneum**, **Except posteriorly in the bare area of the liver**, where it lies in direct contact with the diaphragm.

## Concave Visceral Surface (Postero-Inferior)



- It is the posteroinferior surface, related to abdominal viscera.
- It is covered with peritoneum, **except at the fossa for the gallbladder, the porta hepatis and IVC groove.**
- It bears multiple fissures and impressions for contact with other organs.
- Relations:

1. Stomach

2. Esophagus

3. lesser omentum

4. gallbladder

5. right colic flexure

6. right kidney and right suprarenal gland

7. Duodenum

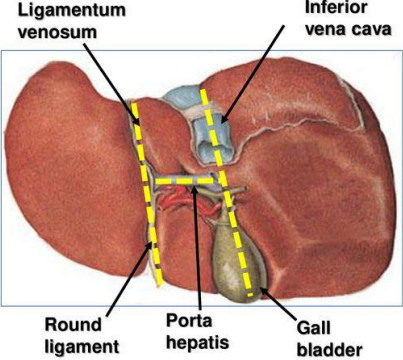
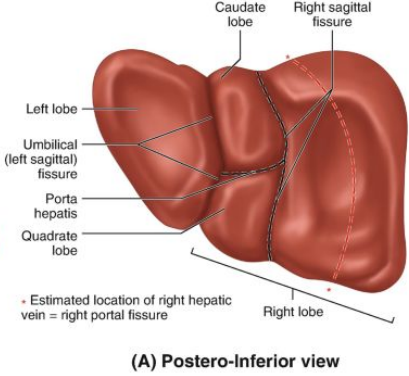
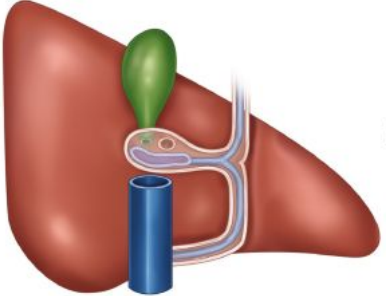
# Fissures & Porta hepatis

MCQ

## Fissures

Two sagittally oriented fissures, linked centrally by the transverse porta hepatis, form the letter H on the visceral surface.

Left Fissure		Right Fissure	
is the continuous groove formed:		is formed:	
<b>Anteriorly</b>	<b>Posteriorly</b>	<b>Anteriorly</b>	<b>Posteriorly</b>
by the fissure for the round ligament (lig.teres).	by the fissure for the ligamentum venosum.	by the fossa for the gallbladder	by the groove for the inferior vena cava.

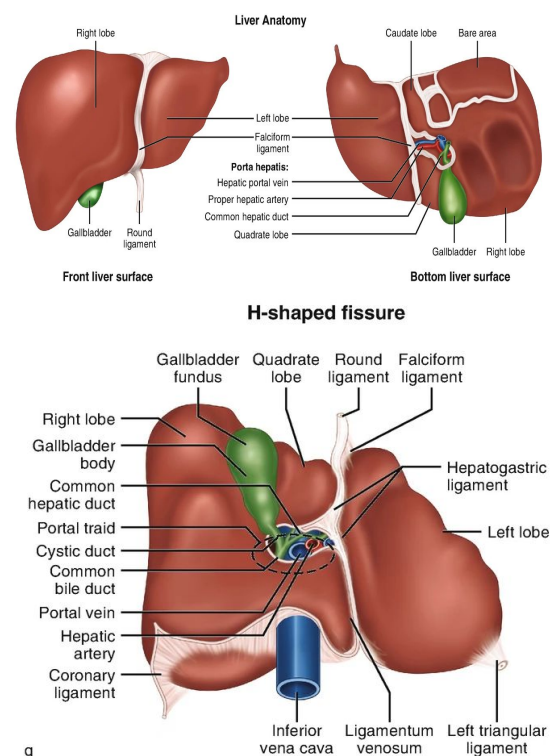
## Porta Hepatis (Hilum of the Liver)

A **transverse fissure** found on the posteroinferior surface and **Lies between the caudate and Quadrate lobes.**

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

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

- Right and left **hepatic ducts.**
- Right and left **branches of the hepatic artery**
- Right and left **branches of the portal vein**
- **Sympathetic and parasympathetic nerve fibers**
- A few **hepatic lymph nodes** lie here; they drain the liver and gallbladder and send their efferent vessels to the **celiac lymph nodes.**



# Lobes Of The Liver

## Division

### Anatomical

The liver is divided into a large right lobe and a small left lobe by the attachment of the falciform ligament.

### Functional

The functional anatomy divides the liver into left and right lobes based on their relation to the division of common hepatic duct, hepatic portal vein, and hepatic artery proper into right & left branches, so the areas of the liver supplied by these branches constitute the functional left or right lobes.

#### large right lobe

The right lobe is further divided by the presence of the gallbladder, the fissure for the ligamentum teres, the inferior vena cava and the fissure for the ligamentum venosum into:

1. Caudate lobe.
2. Quadrate lobe.

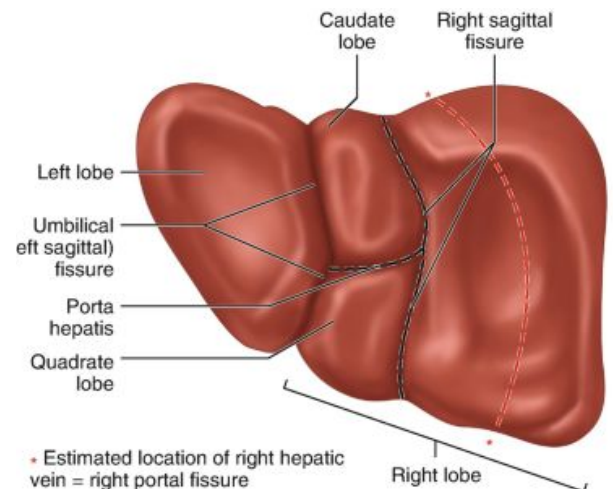
#### small left lobe

The left lobe is smaller and more flattened than the right. It is situated in the epigastric, and left hypochondriac regions of the abdomen. Its upper surface is slightly convex and is moulded on to the diaphragm

#### Right Lobe

#### Left Lobe

**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.**

The Alien from the Pathology took a trip to Anatomy just to ask you this :  
Which structure is responsible for suspending the liver from the diaphragm?

- A. Lesser omentum
- B. Ligamentum teres
- C. Inferior vena cava
- D. Coronary ligament
- E. Falciform ligament

Answer: D

Which lobes of the liver are closely related to the gallbladder?

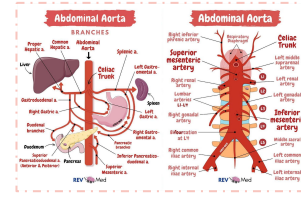
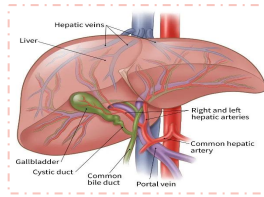
- A. Left and right
- B. Caudate and quadrate
- C. Right and quadrate
- D. Left and quadrate

Answer: C

# Supply & Drainage of Liver

MCQ

## Blood Supply



The blood vessels conveying blood to the liver are

### ▶ Hepatic Artery Proper (30%):

- A branch of the common hepatic artery of the celiac trunk.
- It brings oxygenated blood to the liver.
- Other branches of the common hepatic artery are gastroduodenal and right gastric arteries.

### ▶ Portal Vein (70%):

- Formed by the union of superior mesenteric and splenic veins.
- It brings venous blood rich in the products of digestion, which have been absorbed from the gastrointestinal tract to the liver.

## Branches of both vessels:

### → At Porta Hepatis:

- Both **hepatic artery** proper and **portal vein** terminate by dividing into right and left primary branches, which supply the right and left lobes of liver, respectively.

### → Within the liver:

- The primary branches divide to give secondary and tertiary to supply the hepatic segments independently.

## Venous Drainage

The venous blood is drained by the right & left hepatic veins into the inferior vena cava.

Hepatic veins are intersegmental in distribution and function, draining parts of adjacent segments.

The attachment of these veins to the IVC helps hold the liver in position.

N.B, The peritoneal ligaments and the tone of the abdominal muscles play a minor role in the support of the liver.



# Supply & Drainage of Liver



A really helpful video!  
Make sure to watch it :)

## Lymphatic 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

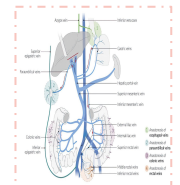
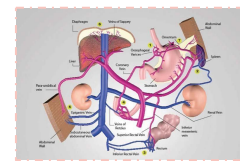
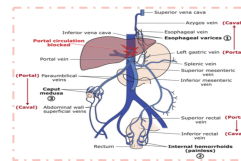
### Sympathetic:

- ▶ From the celiac plexus.
- ▶ Formed by nerve fibers and a group of ganglia around the abdominal aorta and periaortic space.

### Parasympathetic:

- ▶ The anterior vagal trunk gives rise to a large hepatic branch, which passes directly to the liver.

## PortoCaval Anastomosis



PortoCaval/Portal-Systemic Anastomosis is a specific type of anastomosis that occurs between the veins of portal circulation and those of systemic circulation.

In portal hypertension, these anastomosis open and form venous dilatation called varices.

## Sites & Clinical signs:

Lower part of Esophagus → Esophageal Varices

Upper Anal canal → Hemorrhoids or piles

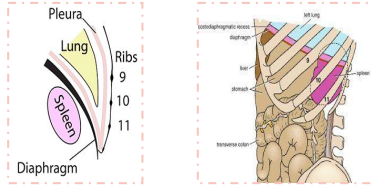
Paraumbilical region → Caput Medusae

Retroperitoneal → Asymptomatic

Intrahepatic → Patent ductus venosus

# Spleen

## Introduction



Largest single mass of lymphoid tissue, ovoid in shape, with notched anterior border.

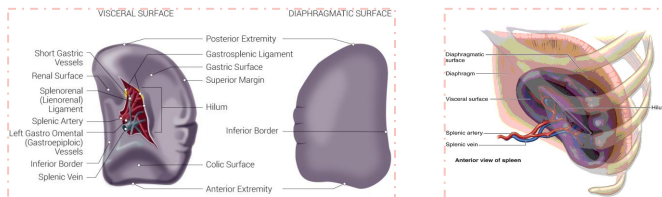
Located in the **left** hypochondrium, deep to the **9th, 10th & 11th ribs**, and is separated from them by the diaphragm and the costodiaphragmatic recess (space in pleural cavity).

Its long axis lies along the 10th rib.

Lower pole extends forward as far as the midaxillary line.

N.B, Normal size spleen cannot be palpated by clinical examination (A healthy spleen is not palpable).

## Surfaces (2)



### Diaphragmatic Surface:

► It is convexly curved to fit the concavity of the diaphragm and curved bodies of the adjacent ribs.

### Visceral Surface:

► It is related to the viscera.

## Borders (4)

Superior

Anterior

Inferior

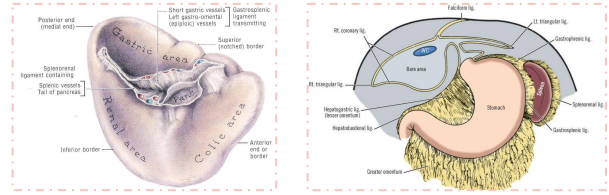
Posterior

Their borders are sharp and notched.

Their borders are smooth and rounded.

# Peritoneal Ligaments & Relations

## Peritoneal Ligaments/Reflections



☉ Spleen is completely surrounded by peritoneum **EXCEPT** at the hilum where its margins give attachment to:

### Gastrosplenic Ligament

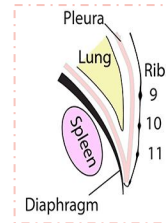
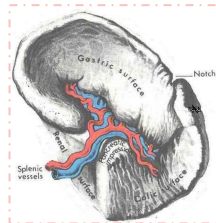
- It connects the spleen to the greater curvature of stomach.
- It carries the **short gastric** and **left gastroepiploic vessels**.

### Lienorenal (Splenorenal) Ligament

- It connects the spleen to the left kidney.
- It carries the splenic vessels and the tail of pancreas.

## Relations

Dr. Khaleel: The relations are **IMPORTANT**



### Anteriorly

- Stomach
- Tail of Pancreas
- Left Colic Flexure
- Left Kidney

1

### Medially

- Left Kidney

2

### Posteriorly

- Diaphragm, which separates the spleen from:
  - Left pleura (left costodiaphragmatic recess)
  - Left lung
  - 9th, 10th, & 11th ribs

3

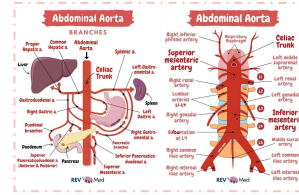
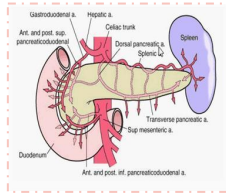
### Inferiorly

- Left Colic Flexure

4

# Supply & Drainage of Spleen

## Splenic Artery



- A Largest branch of the celiac artery.
- B Runs a tortuous course along the upper border of the pancreas.
- C Passes within the **Lienorenal ligament**.
- D Divides into 4-5 terminal branches, which enter the spleen at the hilum.
- E The lack of anastomosis of these arterial vessels within the spleen results in the formation of vascular segments of the spleen, enabling subtotal splenectomy.

## Splenic Vein

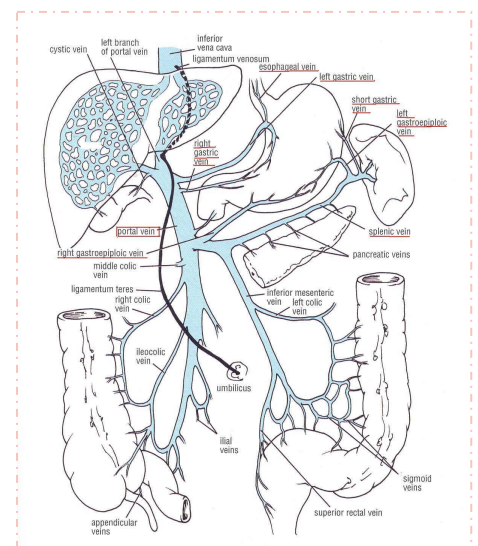
Hilus (Obsolete) = Hilum (More commonly used nowadays)

The **Splenic Vein** leaves the hilum and runs behind the tail and body of the pancreas.

When it reaches behind the neck of pancreas, it joins the superior mesenteric vein to form the portal vein.

### Tributaries:

- Short Gastric vein
- Left Gastroepiploic vein
- Pancreatic veins
- Inferior mesenteric vein



# Supply & Drainage of Spleen

## Lymphatic Drainage

Hilus (Obsolete) = Hilum (More commonly used nowadays)

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.

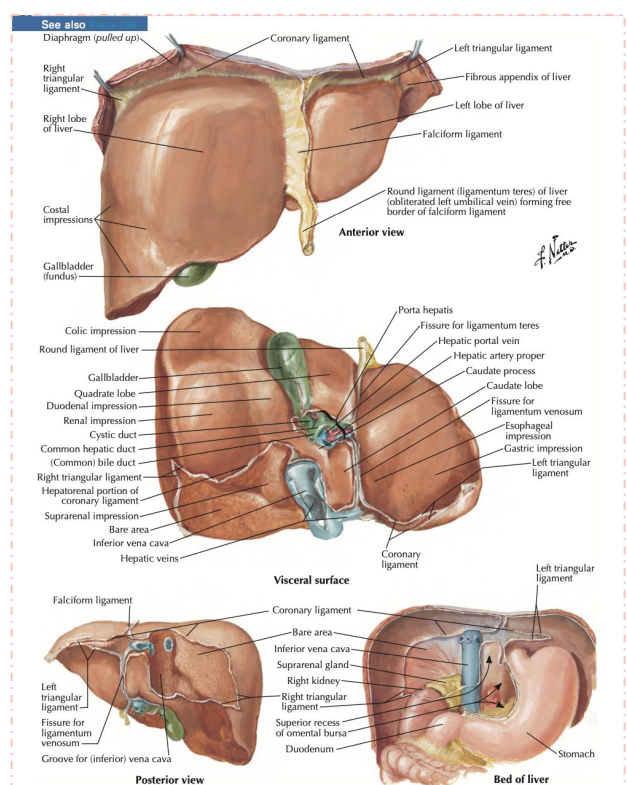
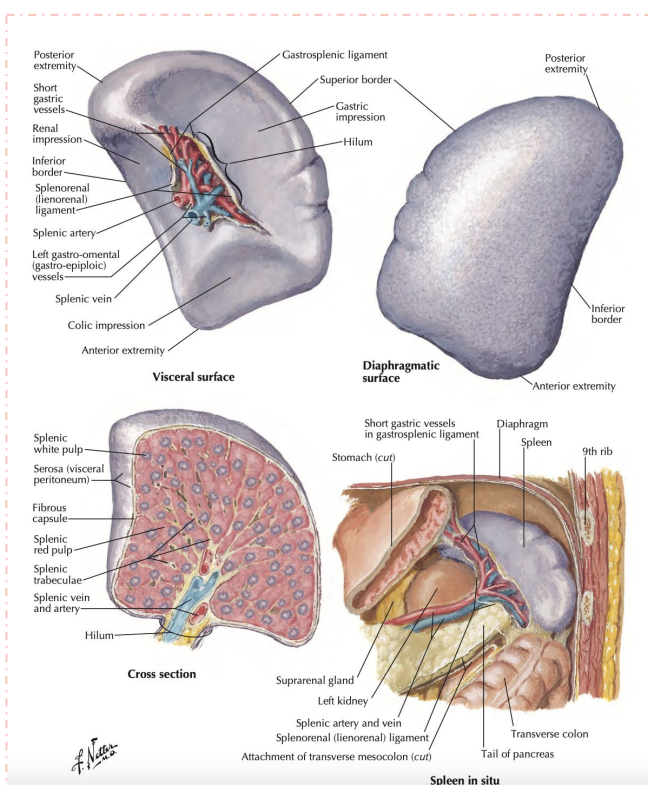
## Nerve Supply

☉ Spleen nerve supply is purely sympathetic, and it is:

- Derived from the celiac plexus.
- Distributed mainly along branches of the splenic artery.
- Vasomotor in function.

## Pictures

EXTRA



# MCQs

Q1. Which of the following is a posterior relation to the Liver?

- |                    |                 |                        |                       |
|--------------------|-----------------|------------------------|-----------------------|
| A. Xiphoid Process | B. Right Kidney | C. Right Costal margin | D. Left Costal margin |
|--------------------|-----------------|------------------------|-----------------------|

Q2. Which ONE of the following is the remnant of ductus venosus?

- |                       |                     |                       |                  |
|-----------------------|---------------------|-----------------------|------------------|
| A. Falciform Ligament | B. Ligamentum Teres | C. Ligamentum Venosum | D. Porta Hepatis |
|-----------------------|---------------------|-----------------------|------------------|

Q3. Which ONE of the following is the remnant of the umbilical vein?

- |                     |                       |                          |                       |
|---------------------|-----------------------|--------------------------|-----------------------|
| A. Ligamentum Teres | B. Falciform Ligament | C. Ligamentum Arteriosus | D. Ligamentum Venosum |
|---------------------|-----------------------|--------------------------|-----------------------|

Q4. Porta hepatis is attached with which one of these peritoneal folds ?

- |                   |                    |                       |                       |
|-------------------|--------------------|-----------------------|-----------------------|
| A. Lesser Omentum | B. Greater Omentum | C. Ligamentum venosum | D. Falciform Ligament |
|-------------------|--------------------|-----------------------|-----------------------|

Q5. Which one of the following is a branch of the splenic artery?

- |                  |                 |                   |                  |
|------------------|-----------------|-------------------|------------------|
| A. Short Gastric | B. Left Gastric | C. Gastroduodenal | D. Right Gastric |
|------------------|-----------------|-------------------|------------------|

Q6. In which of the following ligaments does the splenic artery lie?

- |                         |                           |                         |                        |
|-------------------------|---------------------------|-------------------------|------------------------|
| A. Splenocolic Ligament | B. Gastrosplenic Ligament | C. Gastrocolic Ligament | D. Lienorenal Ligament |
|-------------------------|---------------------------|-------------------------|------------------------|

A1. B A2. C A3. A A4. A A5. A A6. D

FOR ANKI FLASHCARDS



OR [CLICK HERE](#)

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