GI

ANATOMY

#5

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2020

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QUICK RECAP

-the layers of the anterior abdominal wall:

- Skin.
- Superficial fascia.
- Deep fascia.
- Muscular layer.
- Transversalis fascia.
- Extraperitoneal fascia.
- Parietal peritoneum.

THE PERITONEUM

The peritoneum is a thin serous membrane(sac)

- Consisting of:

*** Parietal peritoneum: lines the ant.Abdominal wall**

***Visceral peritoneum: covers (adheres to) the viscera**

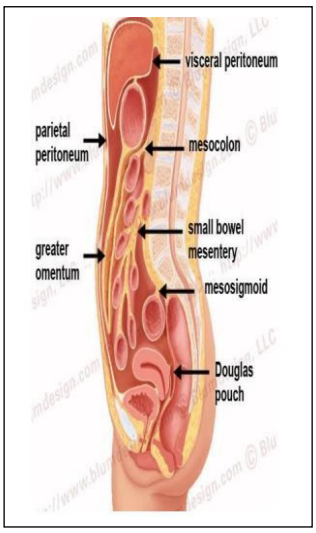
The peritoneum is continuous below with parietal peritoneum lining

The pelvis(the visceral peritoneum completely covers the

Abdominal organs, like the stomach, the liver, except a bare area)

***Peritoneal cavity: the potential space between the parietal and visceral layer of the peritoneum.**

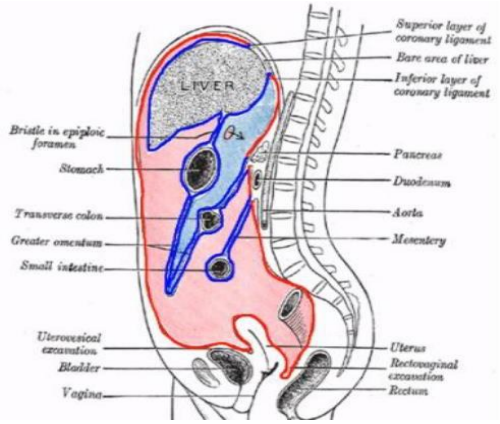
- Potential space: the parietal and visceral peritoneum adhere to each other normally and there is no true anatomical space, it contains a small amount of serous for lubrication to prevent injury and friction, but sometimes air accumulates in it, leading to the widening of this space.



-in male,is a closed sac but in the female,there is a communication with the exterior through the uterine tubes,the uterus,and the vagina

Females have their uterine (fallopian) tubes that have their upper openings into the abdominal cavity (towards the ovary) and their lower opening is towards the uterus and vagina

(notice from the picture that they are both outside the peritoneal cavity), since the vagina communicates with the outer environment, we can say that the uterine tubes connect the peritoneal cavity to the external environment, and that's why the peritoneal cavity is open in females.



red:parietal

blue: visceral

-Peritoneum cavity divided into:

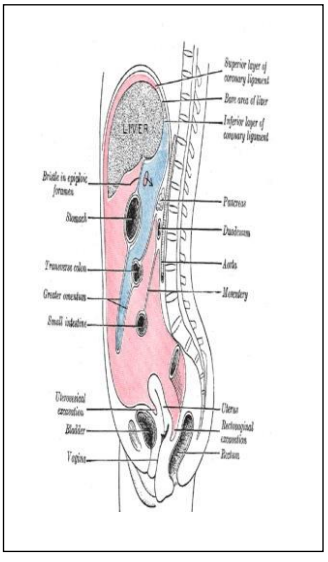
Greater sac :

In pink(pic above), it's located below the diaphragm, above the liver, extending to the area deep to the anterior abdominal wall, curves around the greater omentum above the pelvis and anterior to the posterior abdominal wall.

Lesser sac:

In blue, located behind the stomach, between the layers of the greater omentum, and anterior to the pancreas and the posterior wall of the parietal peritoneum.

-Communication between them by the epiploic(winslow) foramen



• Notice that there are some structures are behind the peritoneum, (Retroperitoneal) like:Duodenum, pancreas, abdominal aorta, inferior vena cava and the kidneys.

• Foramen of winslow (epiploic foramen) is surgically important, for any surgery on the pancreas, posterior wall of the stomach or the doudenum, this foramen is the surgeon's entrance to these organs.

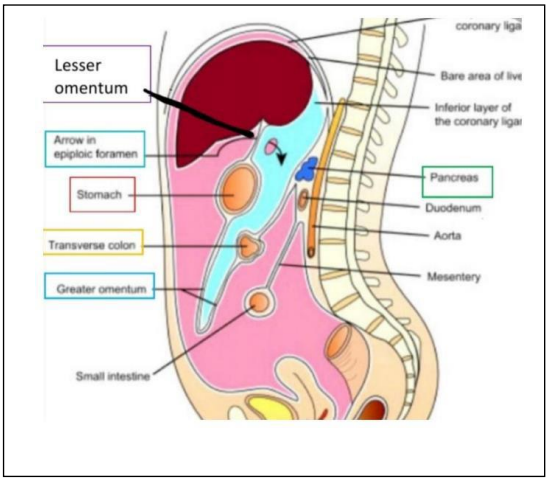
Some useful definitions:

☆ **Omentum**: Double-layered fold of peritoneum that connects the stomach with other abdominal organs.

☆ **Lesser omentum**: Extends from the **liver** to the **lesser curvature** of the stomach.

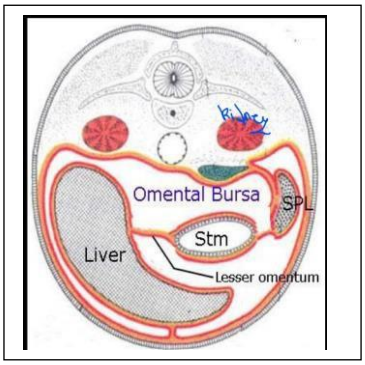
☆ **Greater omentum**: Descends from the **greater curvature** of the stomach and first part of duodenum downwards, then ascends to cover the transverse colon. It continues reaching the **anterior** border of the pancreas, which is one of the retroperitoneal organs, before arriving the posterior abdominal wall.

☆ **Epiploic foramen(opening)/foramen of Winslow**: Passage between the greater and lesser sacs.



LESSER SAC=OMENTUM BURSA(EMBRYOLOGICAL NAME)

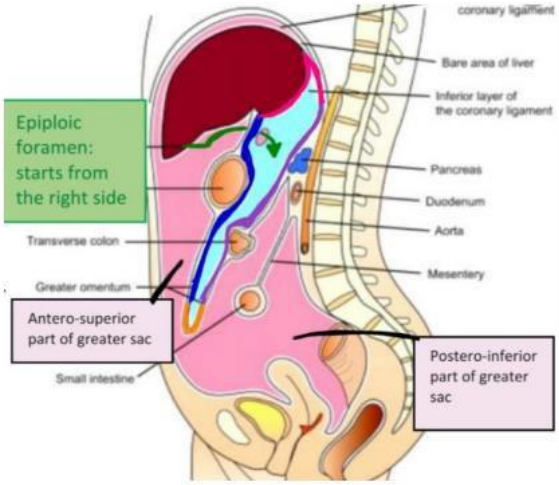
- **Deep to lesser omentum**
- **Behind the stomach**
- **Between two layers of the greater omentum**
- **Under the diaphragm and liver**
- **Deep to lesser opening (Epiploic opening)**



* We have 2 omenta, greater and lesser, the one that's attached to the greater curvature of the stomach is the greater the omentum, and the one attached to the lesser curvature of the stomach is the lesser omentum. The omentum is 2 layers of the peritoneum with a structure between them

*The greater omentum is a fold of visceral peritoneum that is attached to greater curvature of the stomach, it descends toward and then ascend again to surround the transverse colon, then they complete ascending and terminate at the anterior border of the pancreas.

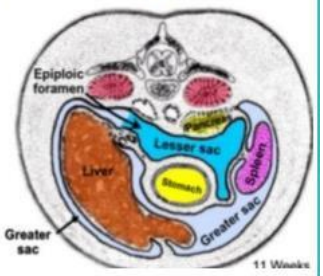
- **Walls** of the **lesser sac** *follow the colors*
  - **Superior** → peritoneum which covers the caudate lobe of liver and the diaphragm.
  - **Anterior** → lesser omentum, peritoneum of *posterior* wall of stomach, and anterior two layers of greater omentum
  - **Inferior** → conjunctive area of anterior and posterior two layers of greater omentum
  - **Posterior** → posterior two layers of greater omentum, transverse colon and transverse mesocolon, peritoneum covering posterior abdominal wall and reaching the anterior border of pancreas.



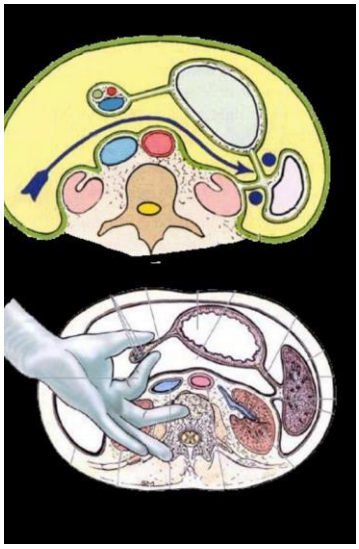
⇒ *Transverse mesocolon:* peritoneum connecting the transverse colon to the posterior wall of the abdomen.

- **Left side** → Spleen, gastrosplenic & splenorenal ligaments.

Abdominal ligaments are composed of 2 peritoneal layers that contain a strong fibrous tissue & connect between 2 organs:
-Gastrosplenic: between the **stomach** and the **spleen**
-Splenorenal (lienorenal): between the **spleen** and the **left kidney**



- **Right side** → Omental foramen.



Foramen of Winslow has borders too,

posteriorly it's bordered by the inferior vena

***.Free (right edge of the lesser omentum has 3 structures:Hepatic artery, common bile duct and portal vein. The clinical importance of the contents of the free edge of lesser momentum If there is bleeding in the liver during the surgeon clamps the portal vein, the hepatic artey and the bile duct to stop the bleeding and perform the surgery**

GREATER SAC

- **Deep to ant.Abdominal wall**
- **Below the diaphragm**
- **Above pelvic viscera**

Out to:

Liver→ surround all the liver except barearea

Stomach→ completely surrounded by peritoneum

Transverscolon

Greater omentum→ two layers of peritoneum from greater curvature of Stomach

- (at the first inch of the duodenum) downwards to the abdominal

cavity,then upwards again to surround the transverse colon, then to the anterior border of the pancreas, and finally to the posterior abdominal wall.

Omentum is 2 layers of pritoneum with fat, blood vessels, nerves, lymphatic vessels and lymph nodes within these layers

Duodenum→just the anterior surface covered by peritoneum

-We count the duodenum as a retroperitoneal organ except for the first inch of it (because it is practically connected to the pylorus of the stomach, so it is contained in the peritoneum) and the last inch of it (because it is connected to the jejunum)

Small intestine → surrounds all the intestine & form mesentery

Mesentry: the peritoneum covering the small intestine (jejunum and ileum), it starts at the posterior abdominal wall as parietal peritoneum and continues its way to surround all 6 meters of the small intestine. It is also rich in blood and nerve supply (sympathetic and parasympathetic fibers) and lymphatic vessels and nodes.

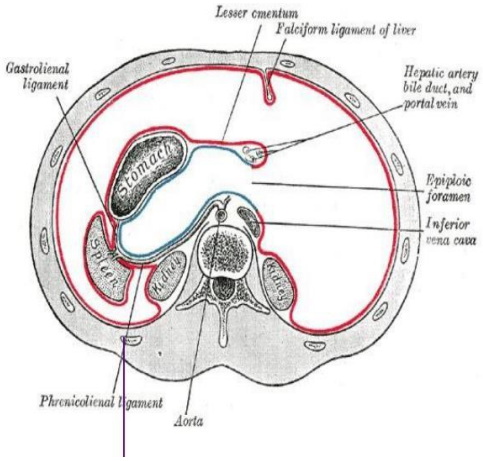
-Subdivided greater omentum into :

Antero- superior part

Postero - inferior part

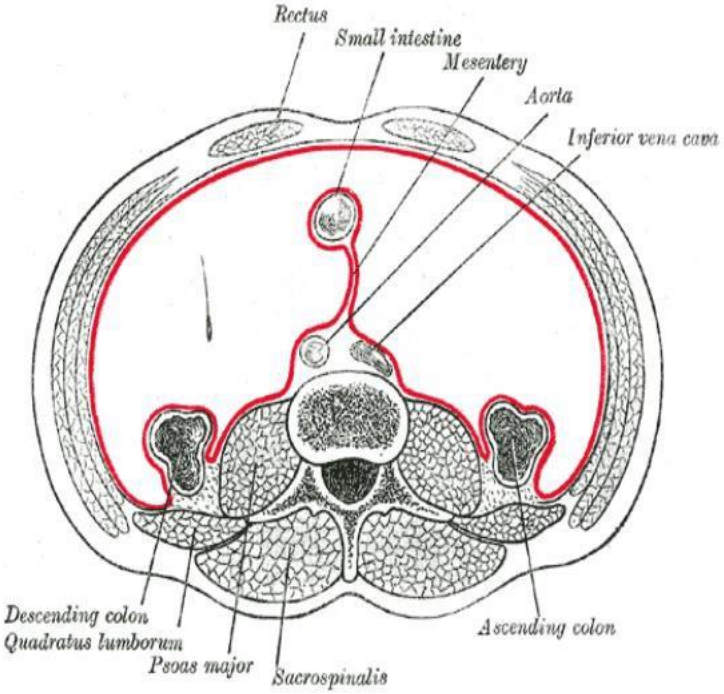
Greater sac…..cont

- Antero – superior divided by Falciform ligament into:
  - Right part
  - Left part



Greater sac……cont

- Poster – inferior divided by mesentery & small intestine
  - Right part
  - Left part



OMENTAL (EPIPLOIC)FORAMEN

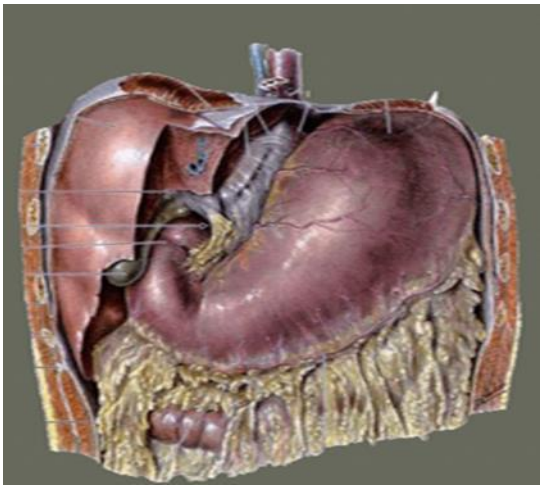
ž Position: - lies between the liver and duodenum - just above the first part of the duodenum- behind the right free edge

of lesser omentum which

contains the portal veins, hepatic artery, and common bile duct.

- in front of the inferior vena cava - short, vertically flattened passage, about 3cm

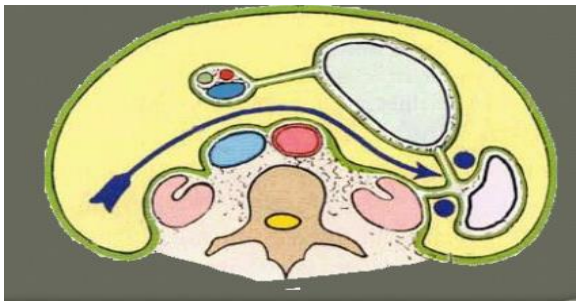
Under the caudate lobe of the liver, and above the first part of duodenum



Liver in Situ

Note that the lesser omentum extends from the liver (specifically: porta hepatis) to the lesser curvature of the stomach, and to the first part of the duodenum.

While the greater omentum is hanging from greater curve of stomach like apron, covering transverse colon and much of small intestine.

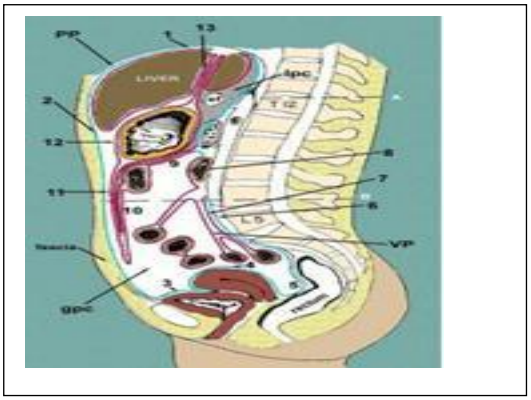


The lesser sac is bound anteriorly by the posterior wall of the

stomach, superiorly by the caudate lobe of the liver, to the left side

by the spleen

The omental bursa (lesser sac) communicates with the greater sac through the omental foramen.



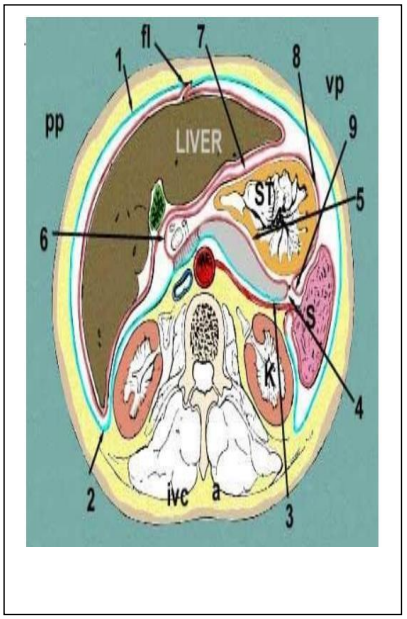
ž Boundaries

ž Anteriorlly

- Free border of lesser omentum contain

1Bile duct(Rt & ant)

2Hepatic artery(Lt & anT) 3- Portal vein(post.)



ž Posteriorly I.V.C

ž Superiorly

Caudate process of caudate lobe of liver

ž Inferiorly

ž First part of duodenum

FUNCTION OF THE PERITONEUM

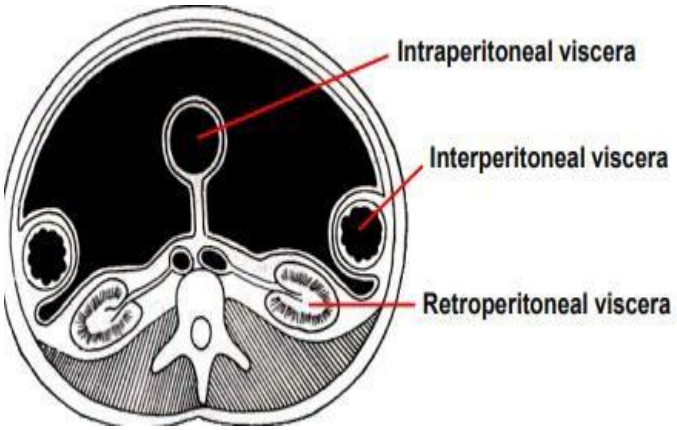
- **Secretes a lubricatingserous fluid that continuously**
- **moistens the associatedorgans**
- **Fat storage (for energy) (especially in the omenta and mesentery)**
- **Defense role**

The greater omentum is the policeman of the abdomen, whenever an infection occurs in one of the viscera, it isolates it to keep the infection

from spreading to other viscera, for example, when you preform appendectomy, you'll notice that the greater omentum is adherent to the inflamed appendix, if it was not adherent, the diagnosis might be wrong.

THE RELATIONSHIP BETWEEN VISCERA AND PERITONEUM

- **Intraperitoneal viscera**
- **viscera is almost totally covered with visceral peritoneum**
- **example, stomach,first& last inch of duodenum, jejunum, ileum, cecum, vermiform appendix, transverse and sigmoid colons,spleen and ovary.**



The intra peritoneal organ	The peritoneal fold
Stomach	Greater and lesser omentum
Small intestine	Mesentery
Large intestine	Meso (e.g. transverse colon, mesoappendix)

The relationship between viscera and peritoneum

Retroperitoneal viscera

⍰ some organs lie on the posterior abdominal wall

⍰ Behind the peritoneum

⍰ they are partially covered by peritoneum on their anterior surfaces only

ž Example

kidney,suprarenal gland, pancreas,descending and ascending colon, upper 3rd of rectum

Duodenum (except its first and last inches), and ureter, aorta and I.V.

Interperitoneal viscera:

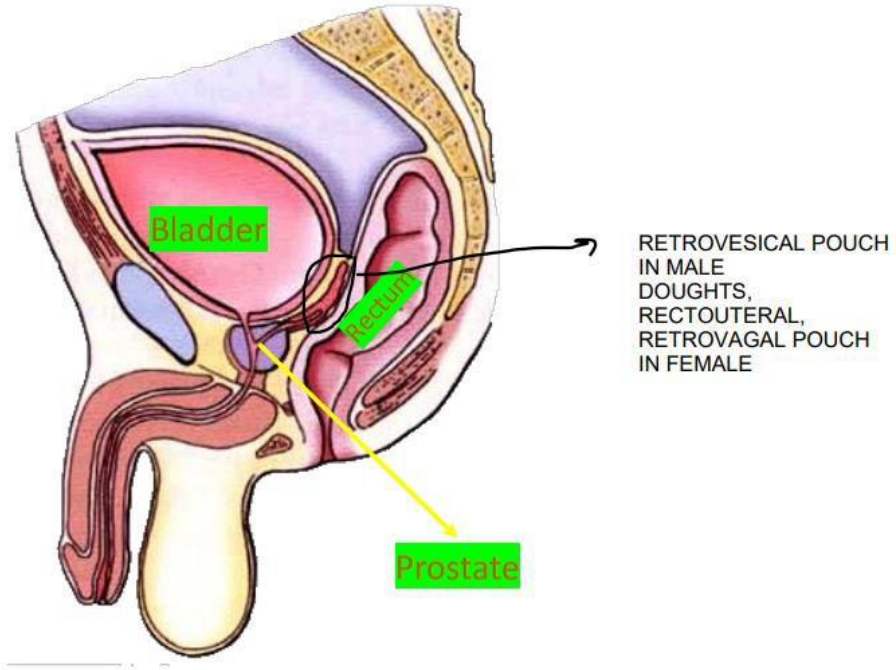
ž Such organs are not completely wrapped

by peritoneum (contain bare areas)

ž one surface attached to the abdominal walls

or other organs. Example liver, gallbladder. (because it has a bare area that is contained in the gallbladder fossa in the liver), urinary bladder and uterus(those two are in the pelvis, therefore, the peritoneum covers their superior surface only)

INTRAPERITONEAL VISCERA



THE PERITONEAL REFLECTIONS OR FOLDS

ž Certain terms, often arbitrary, are commonly used for

the peritoneal reflections.

ž Aperitoneal reflection that connects the intestine and body

wall is usually named according to the part of the gut to which

it is attached.

ž For example, the reflection to jejunum and ileum is termed the mesentery,that to the transverse colon is the

transverse mesocolon.

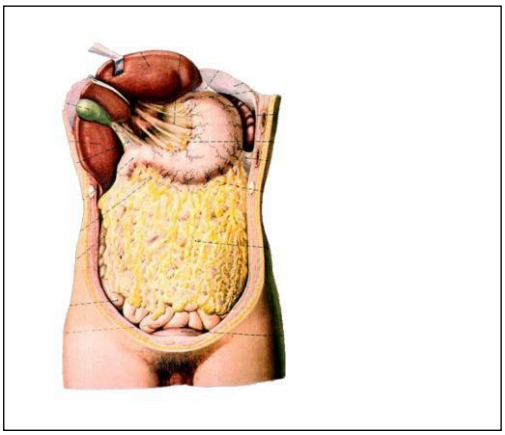
ž Some peritoneal reflections between organs or between the body wall and organs, are termed ligaments or folds(MAY INTERNAL HERNIA HAPPENS WITHIN). Most of such ligaments or folds contain blood vessels.

Broad peritoneal sheets associated with the stomach are termed omenta.

1- Omenta :

Two-layered fold of peritoneum that extends from stomach to adjacent organs

two omenta: Lesser omentum, Greater omentum

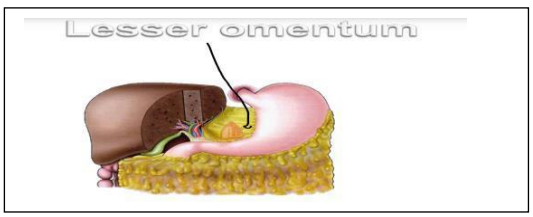


LESSER OMENTUM

- Two-layered fold of peritoneum

- Extends from porta hepatis, fissure of ligamentum venosum and the diaphragm to lesser curvature of stomach and superior part of the duodenum, then the two layers separate from each other and surround the whole stomach anteriorly and posteriorly, then at the greater curvature, the two layers meet each other again and descend forming the greater omentum, the greater omentum descends until a certain point and then curve upward to enclose the transverse colon.

ž The lesser omentum is divided into:



ž Hepatogastric ligament from porta hepatis to lesser curvature

of stomach

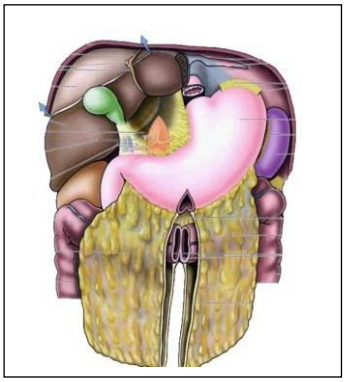
ž Hepatoduodenal ligament

-Extends from porta hepatis to superior part of duodenum,

-at its free margin enclose 3 structures(3 key structures) common bile duct Ant. proper hepatic artery at the lateral of the common bile duct, hepatic portal vein posteriorly.

CONTENTS OF LESSER OMENTUM

- Blood vessels Rt. & Lt. gastric vessels
- Lymph nodes & lymphatic vessels
- Fat
- Autonomic N.S sympathetic
  + parasympathetic (vagus nerve)



GREATER OMENTUM

- It is the largest peritoneal fold.

- It consists of a double sheet, folded on itself so that it is made up of four layers.

-The anterior two layers descend from the greater curvature of stomachand superior part of the duodenum and hangs down like an apron in front of coils of small intestine then turn up on the back of itself, and ascend to the transverse colon

- the two layers are separated to cover the anterior and posterior surfaces of transverse colon.Then they form the transverse mesocolon, the transverse mesocolon extend from transverse colon to reach the anterior border of pancreas

ž The upper part of the greater omentum which extends between the stomach and the transverse colon is termed the gastrocolic ligament.

ž In adult, the four layers of greater omentum are frequently adhered together, and are found wrapped about the organs in the upper part of the abdomen

Contents of Greater omentum (between the descended layers)

- **Right and left** Gastroepiploic vessels (artery, vein)
- Lymph nodes & lymphatic vessels
- Fat
- Autonomic N.S sympathetic + parasympathetic (vagus nerve)

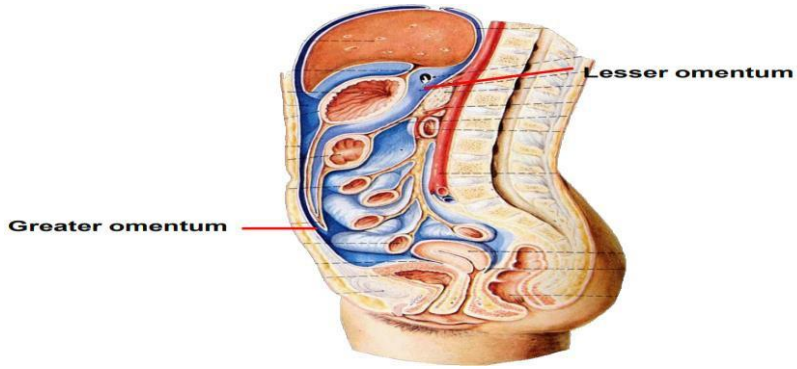
FUNCTIONS OF GREATER OMENTUM

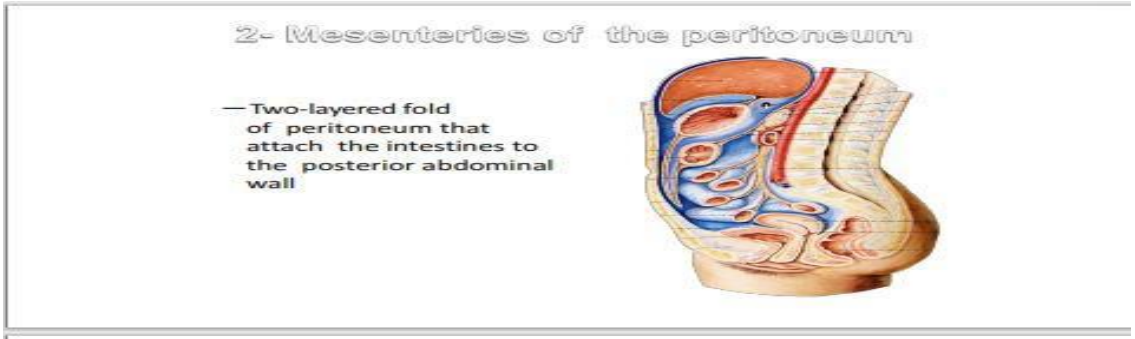
ž ① protective function:The greater omentum contains numerous fixed macrophages,which performs an important protective function.

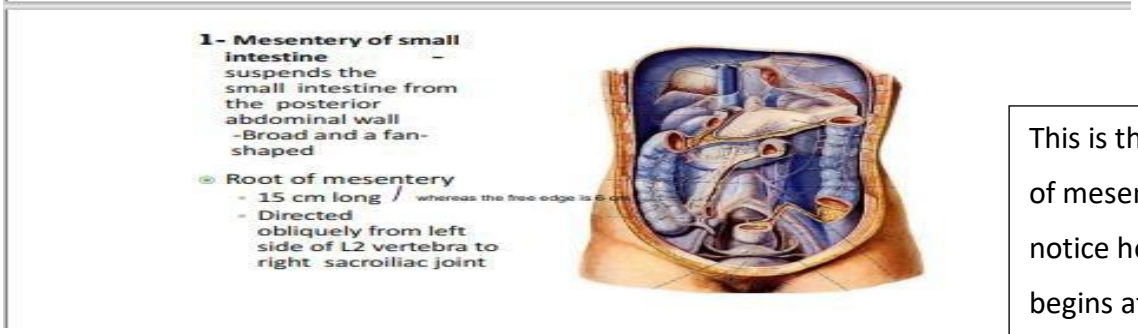
ž ② storehouse for fat: The greater omentum is usually thin, and presents a cribriform apperarance, but always contains some adipose tissue, which in fatty people is present in considerable quantity.

ž ③ migration and limation:The greater omentum may limit spread of infection in the peritoneal cavity. Because it will migrate to the site of any inflammation in the peritoneal cavity and wrap itself around such a site, the greater omentum is commonly referred to as the "policeman" of the peritoneal

cavity. ž It also houses blood vessels and functions in immunity







This is the root of mesentery, notice how it begins at the level of L2 near the midline then extends obliquely to the level of right sarcoiliac joints

Contents of the mesentery

- the jejunal and ileal branches of the superior mesenteric artery &veins

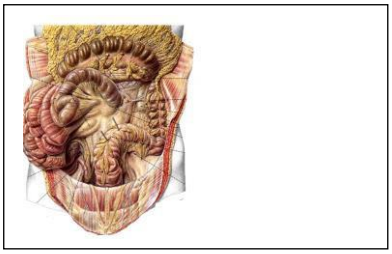
- nerve plexuses

- lymphatic vessels

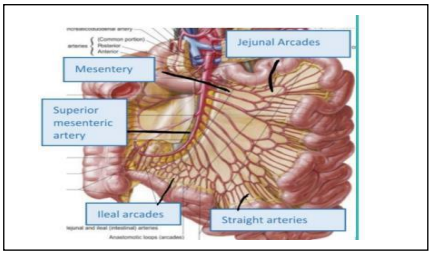
- the lymphatic nodes,

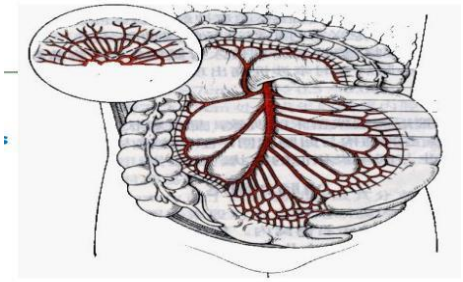
- connective tissue

- fat



- Branches from the superior mesenteric artery form arterial anastomoses called **arcades**.
  In the jejunum → these arcades are simple
  In the ileum → they are more complicated (about 4 or 5 arcades)
- **Straight** arteries called **vasa recta** come off from these arcades and head towards the intestine.
  In jejunum→ long vasa recta In ileum→ short vasa recta.





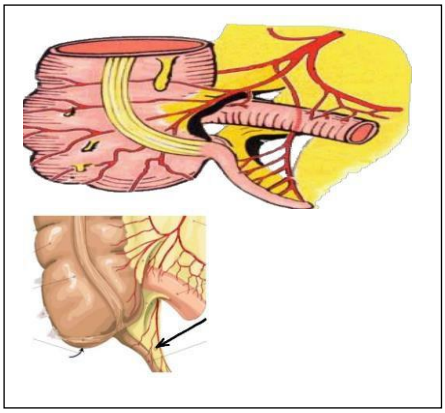
2- Mesoappendix

ž Triangular mesentery

— extends from the terminal part of theileum to appendix

ž Appendicular artery,vein and lymphatics.

Runs in free margin of the mesoappendix



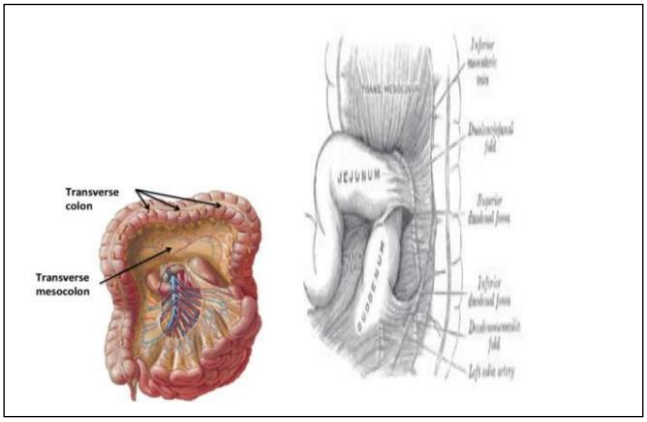
3.the transverse mesocolon

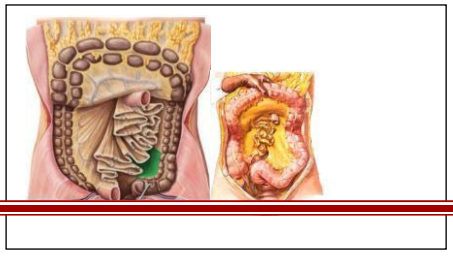
-It is a broad fold

- Connects the transverse colon to the anterior border of the pancreas.

Contents

- The blood vessels
- Nerves
- lymphatics of the transversecolon.





4. segmoid mesocolon

it is a fold of peritoneum

-attaches the sigmoid colon to the pelvic wall.

Contents

- **The sigmoid vessels**
- **Lymphatic vessels**
- **Nerves**
- **<u>The left Ureter descends into the pelvis behind its apex.</u>**

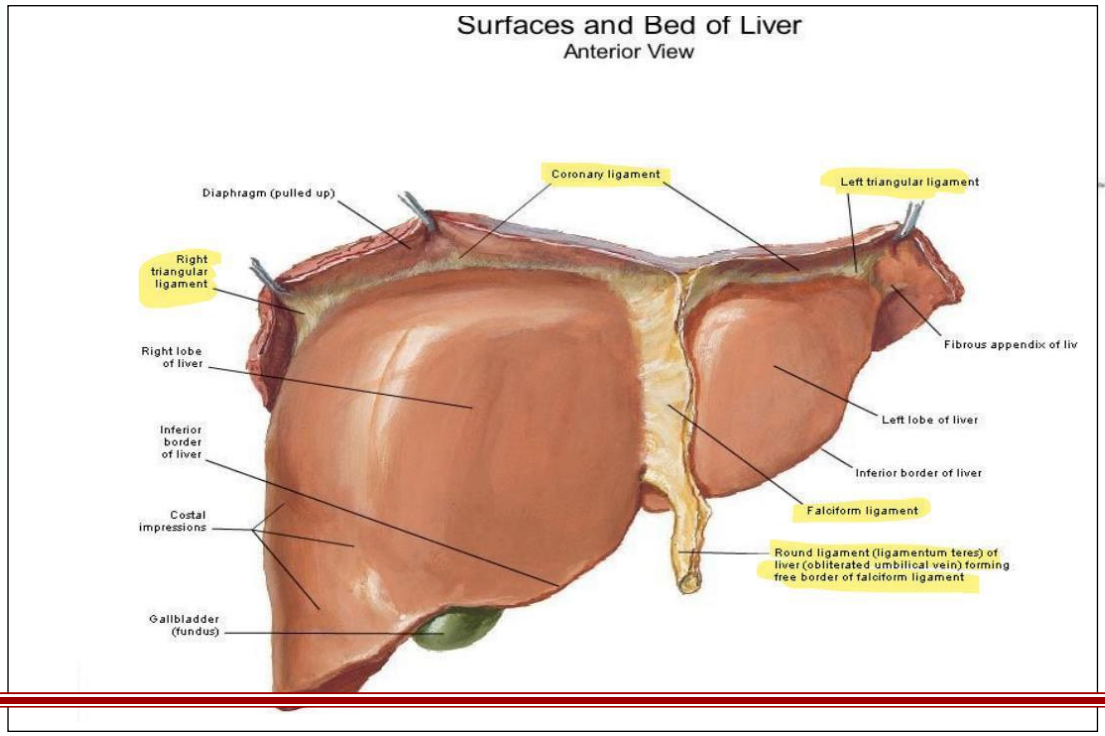
-Remember that the ascending and descending colons are retroperitoneal, therefore they do not have a meso

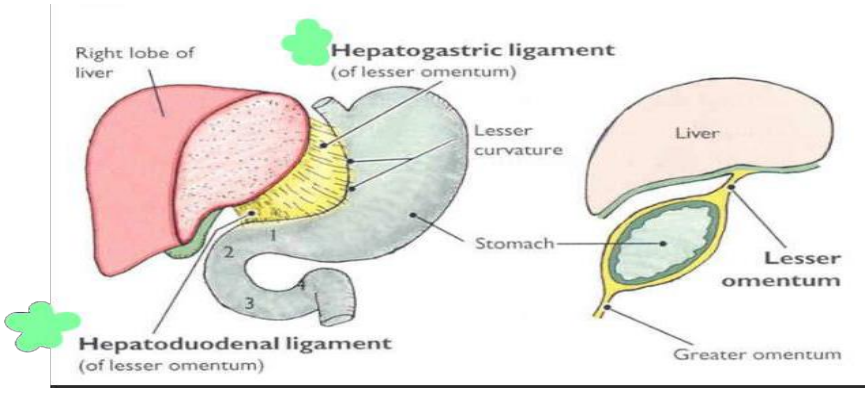
☆ Ligaments of the peritoneum (strong)

2 layers of peritoneum (peritoneal reflections) between organs or between the body wall and organs.

1- Ligaments of the liver

Ligaments of the liver	Notes
The falciform ligament of liver	• <u>Sickle-shape</u> • Extends from anterior abdominal wall (umbilicus) to liver • Free border of the ligament contains ligamentum teres (*the ligament below*)
The ligamentum teres hepatis	• In free edge of falciform ligament • It is an obliterated umbilical vein
The coronary ligament	The area between upper and lower layer of the coronary ligament is the bare area of liver which contracts with the diaphragm
The right triangular ligament	Formed by right extremity of coronary ligament
The left triangular ligament	Formed by left extremity of coronary ligament
The hepatogastric ligament	The portion of the lesser omentum extending between the liver and the stomach
The hepatoduodenal ligament	Free edge of lesser omentum





-clinical note: in cases of untreated appendicitis, it becomes a chronic infection and abscesses may form,

فيبقى المريض دايما نايم على يمينه وحاطط ركبته ببطنه ومقشعر)مش عارفة كيف اكتبها باالنجلش صراحة(

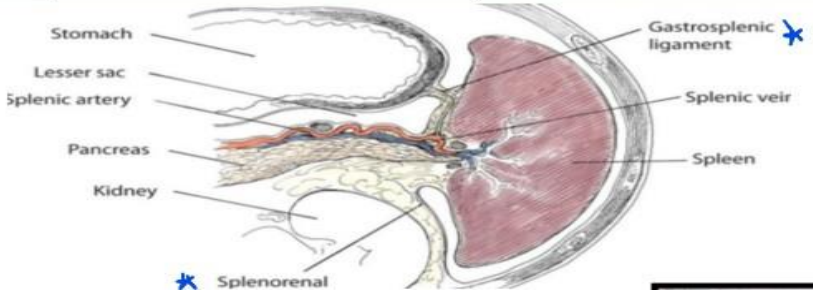
So the pus will reach the right diaphragmatic space and form an abscess, but it won't reach the left side SINCE FALCIFORM LIGAMENT IS THERE.

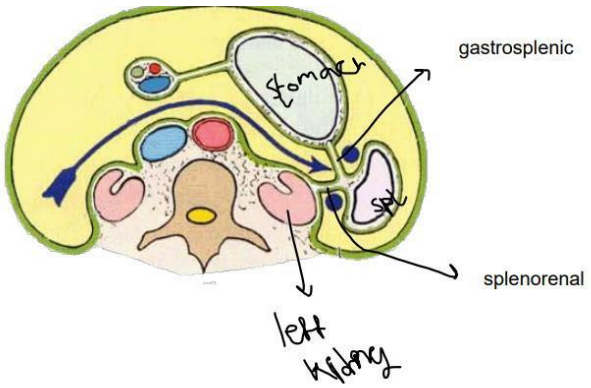
2- Ligaments of stomach

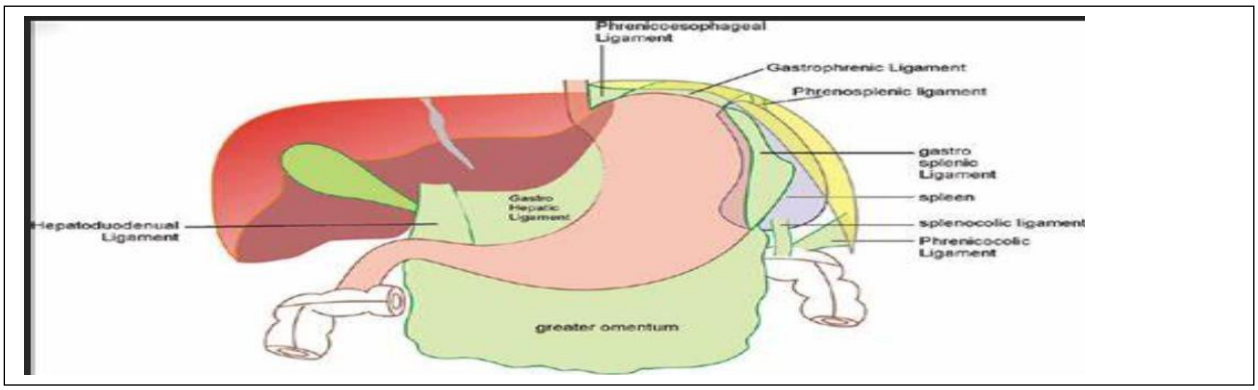
Hepatogastric ligament, Gastrosplenic ligament, Gastro phrenic ligament, Gastrocolic ligament, gastropancreatic ligament

3- Ligaments of the spleen

Splenic ligaments	Notes	Contents
Gastrosplenic ligament	Connects the fundus of stomach to hilum of spleen	▪ The short gastric & left gastroepiploic vessels pass through it.
Splenorenal ligament (lienorenal)	▪ Extends between the hilum of spleen and left kidney. ▪ Important clinically: trauma to the left ribs number 9,10,11 causes spleen rupture → splenectomy → requires vessel ligation (*like in tonsillectomy*)	▪ The splenic vessels ▪ Lymphatic vessels & nodes ▪ Nerves ▪ The tail of pancreas → if injured causes secretion of pancreatic contents → peritonitis ⇒Tail of pancreas should stay intact during splenectomy







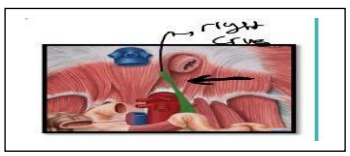
Clinical importance of the splenorenal ligament:

It contains the tail of pancreas, so whenever a surgeon is doing a splenectomy, (thereby ligation and cutting the splenic vessels that are contained in the splenorenal ligament too) the surgeon must be careful not to injure the tail of the pancreas, because any injury to the tail of the pancreas will cause leakage to its secretions, and then peritonitis, so the surgeon must be careful not to cause that mess.

What is the possible reasons for a surgeon to do a splenectomy?

Let's say that any trauma on the left 9,10,11 ribs will cause a rupture in the spleen, and since the spleen is the reservoir of blood, it will cause bleeding, so the solution here will be splenectomy

4- The suspensory ligament of duodenum



- Sometimes named Treitz ligament
- Attached to the right crus of diaphragm

-located at the junction between duodenum(retroperitoneal) & jejunum(intraperitoneal) (landmark between them in surgeries)

5- The phrenicocolic ligament

- It is a fold of peritoneum which extends from the left

colic flexure to the diaphragm opposite the 10th and 12th ribs

6- Phrenicosplenic ligament

Between the diaphragm and the spleen

7- Splenocolic ligament

Between the colon and the spleen

PAST PAPER

-The ventral mesentery forms all the following ligamentsand omenta EXCEPT:

a. Falciform ligaments

b. Ligamentum teres

c. Coronary ligaments

d. Triangular ligaments

e. Lesser omentum

Answer: b

Wrong about mesentery

a. jejunum has wide diameter compered to ileum

b. in the jejunum there are simple arcades and short vasarectea

Answer: b

The lesser omentum contains all the following structures EXCEPT:

a. The left gastric artery.

b. The hepatic artery.

c. Common bile duct.

d. Branches of the vagus nerves.

e. The right gastroepiploic artery.

Answer: e

-Wrong about epiploic foramen:

a. between the greater sac and the lesser sac.

b. quadrate lobe is superior to it

Answer: b

-Wrong

a. ligament of Treitz attach to left crus

b. DJ junction is held in position by the ligament of Treitz

Answer: a

DONE

V2

Check the yellow highlight