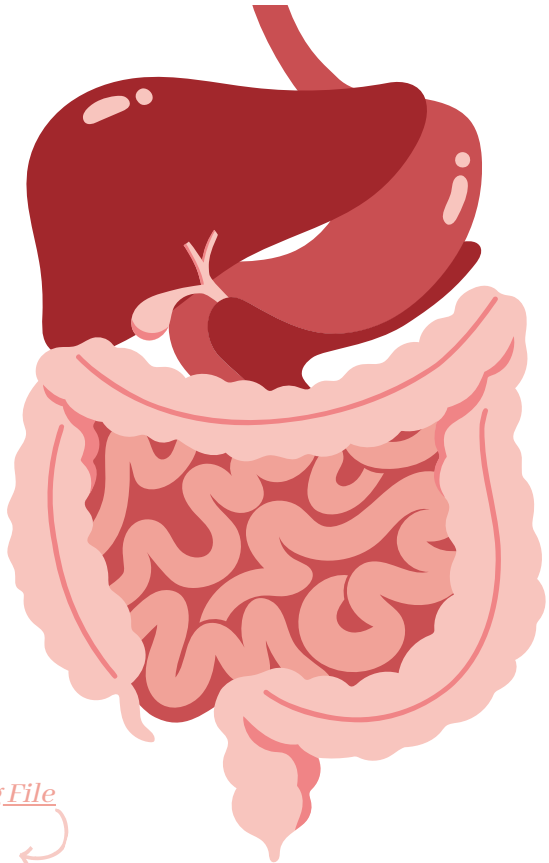
MED 443
King Saud University

Anatomy 443

Reviewed by
Mohammed AlEssa
Abdulaziz AlFuhayd
Lama AlMutairi

Anatomy of the Omentum

GNT Block



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The Editing File

Objectives

- Brief knowledge about peritoneum as a thin serous membrane and its main parts; parietal and visceral.
- The peritoneal cavity and its parts the greater sac and the lesser sac (Omental bursa).
- The peritoneal folds : omenta, mesenteries, and ligaments.
- The omentum, as one of the peritoneal folds
- The greater omentum, its boundaries, and contents.
- The lesser omentum, its boundaries, and contents.
- The omental bursa, its boundaries.
- The Epiploic foramen, its boundaries.
- Mesentery of the small intestine, and ligaments of the liver.
- Nerve supply of the peritoneum.
- Clinical points.

This lecture was presented by :

Dr. Zahid Kaimkhani Dr. Sanaa Al-Shaarawi

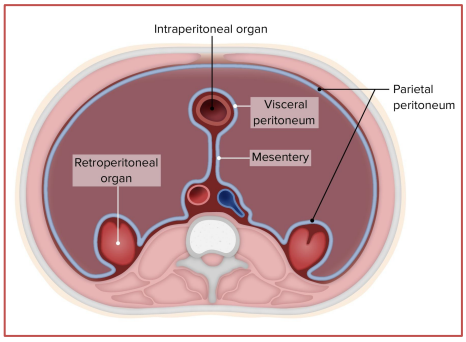
We recommend you watch these 2 videos: Vid1 & Vid2

You can find Atlas by Clicking HERE!

The Peritoneum

overview

- It is a thin serous membrane.
- acts to support the viscera, and provides a pathway for blood vessels and lymph.
- Lining the wall of the abdominal and pelvic cavities (the **parietal peritoneum** covers the ant & post wall, the undersurface of the diaphragm & pelvic cavity).
- Covering the existing organs, (the **visceral peritoneum** leaves the post wall/diaphragm to form a partial/complete investment for viscera).
- The potential space between the two layers is the **peritoneal cavity**
  (The potential space (not actual) between the two layers (PP&VP) is the peritoneal cavity).

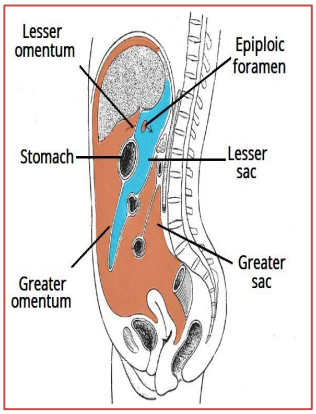


The peritoneal cavity (PC)

- The **peritoneal cavity** is the largest one in the body.
- Contains few mm of tissue fluid to lubricates adjacent surface.
- Divisions of the peritoneal cavity:
  - **A. Greater Sac (GS):** extends from diaphragm down to the pelvis. General PC or body cavity
  - **B. Lesser Sac (Omental bursa):** lies behind the stomach. A subsection or diverticulum of the PC behind the stomach. Opens into GS thru a aperture in front of IVC- epiploic foramen
- Both cavities are interconnected through the **epiploic foramen.**
- **In Males**: the peritoneum is a closed sac.

Because it doesn't communicate with the exterior

- **In Females**: the sac is not completely closed because it communicates with the exterior through the uterine (fallopian) tubes, uterus and vagina.



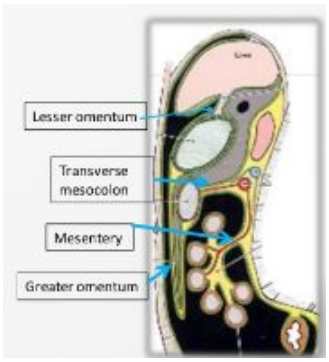
The Peritoneum

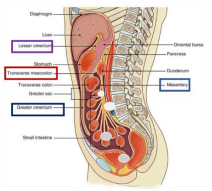
Folds of the peritoneum (reflections)

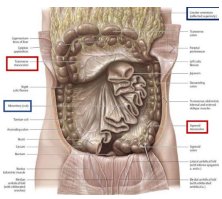
- **Types of Peritoneal Folds:**
  - Omenta. Lesser omentum and greater omentum.
  - Mesenteries.
  - ligaments.
  - Mesocolon. transverse mesocolon, sigmoid mesocolon and mesoappendix.
- They all **permit** blood, lymph vessels and nerves to reach the viscera.

Peritoneal folds that are related to the stomach are called omentum, If they're related to the small intestine well call them mesentery, and for any other structure we call them ligaments #439

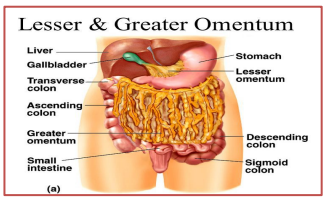
- Connects vescera to the abdominal wall or to one another; these are:
  - Mesentery; the double fold supporting the small intestine
  - Mesocolon; the double fold supporting the transverse & sigmoid colon & appendix called transverse mesocolon, sigmoid mesocolon and mesoappendix.
- Omentum; the double fold connect the stomach to the liver- **Lesser omentum** and connect stomach to the colon- **Greater omentum.**
- Ligaments; simple peritoneal folds attached to liver, stomach & spleen (coronary ligament, gastrosplenic ligament etc.)



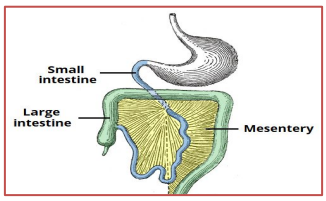




Omenta:



Mesenteries:

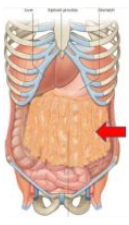
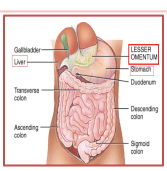
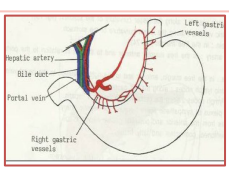
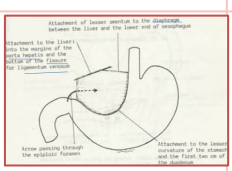
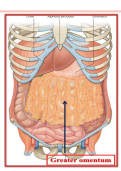
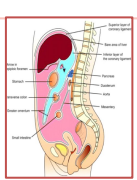


Intraperitoneal and Retroperitoneal structures
(describe the relationship between various organs and their peritoneal covering)

Intraperitoneal organ	Retroperitoneal organ
Intraperitoneal structure is nearly **totally covered** by **visceral peritoneum.** **Examples:** Stomach **Part 1 of duodenum** Jejunum, ileum Cecum, appendix **Transverse colon** Sigmoid colon,Liver, gallbladder **Tail of pancreas** Spleen Ovaries and the uterus.	Structure that lies **behind the parietal peritoneum,** so **partially covered** by the parietal peritoneum (anteriorly and on the side) (fixed on the posterior abdominal wall) and has no supporting mesentery. A useful mnemonic is SAD PUCKER Suprarenal glands, Aorta and inferior vena cava, Duodenum part 2-4 (All except the duodenal cap- first 2cm), Pancreas (All except the tail), Ureters, Colon(Ascending and Descending), Kidneys, Esophagus, Rectum.

The Omenta

The omenta is a **Two layered fold of peritoneum** connecting the stomach to another viscus. The Gastrosplenic omentum; connects the stomach to the spleen.

	The Lesser Omentum	The Greater Omentum (Policeman of abdomen)
Attachment	Attaches the lesser curvature of the stomach to the liver, it's also called the Gastrohepatic Omentum. Extends between the liver and the lesser curvature of the stomach + 1st part of duodenum.	Connects the greater curvature of the stomach with the first part of the duodenum to the transverse colon
Course	(1) It is continuous as the two layers of peritoneum which cover the anterior & posterior surfaces of stomach and 1st part of the duodenum. (2) Ascend as a double fold to the ★**porta hepatis of liver, and fissure for ligamentum venosum.**	The largest peritoneal fold, with cribriform appearance, contains some adipose tissue. It consists of a double sheet of peritoneum, folded on itself so that it is made up of four layers (2 anterior ,2 posterior). (1) The two layers which descend from the greater curvature of the **stomach** like an apron and then and **commencement of the duodenum**, pass downward in front of the small intestines. (2)then turn upon themselves. (3) and ascend to the **transverse colon**, where they separate and enclose it. (4) then continuous with transverse mesocolon which connects the trans.colon to posterior abdominal wall.
Left border	To the left of porta hepatis it is carried to the **diaphragm**.	Continuous with the **gastrosplenic ligament.**
Right border	Is a **free margin**; constitutes the anterior boundary of the epiploic foramen.	Extends as far as the commencement of the duodenum.
Content	Contents between the two layers of the lesser omentum: Close to the right free margin, are the 1-hepatic artery 2- common bile duct 3-portal vein, lymphatics, and hepatic plexus of nerves At the attachment to the stomach, run the right and left gastric vessels. Clinical significance: Lesser Sac may be accessed thru this ligament (Broud yellow arrow)   - on left side it envelops the spleen (spleen lies in general PC)	-Anastomosis between the right and left gastroepiploic vessels + lymphatic nodes & vessels found In the part of greater omeentum between the Stomach & Transverse Colon called the Gastrocolic omentum. -Contains adipose tissue and macrophages.
Pictures	     	

Omental bursa (lesser sac)

Omental bursa (lesser sac) is a part of the peritoneal cavity (space) **behind the stomach**
And its boundaries are

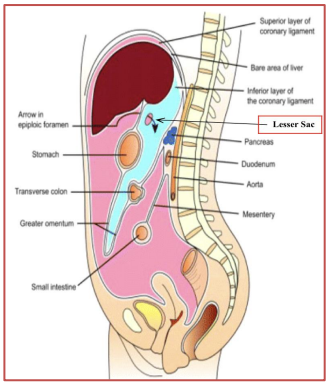
Male Slides

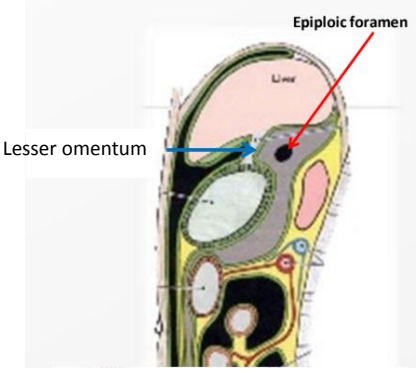
-Stomach attachment extend b/w esophagus -2cm of the duodenum

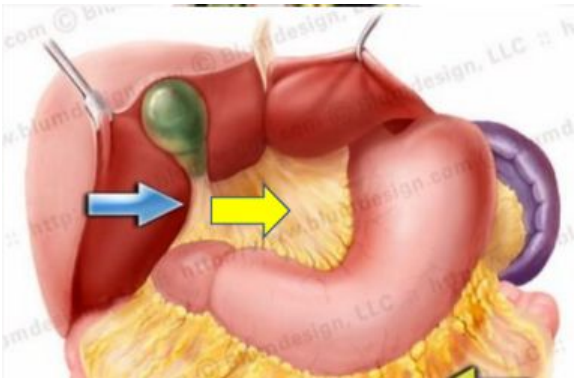
- LIver attachment is L-shaped (fissure for lig.venosum & porta hepatis).

-B/w liver & duodenum right free margin -ant border of **epiploic foramen (of winslow)**

- Traced downward it become the **greater omentum** and upward enclose the liver and the spread as the **coronary, triangular & falciform ligaments.**







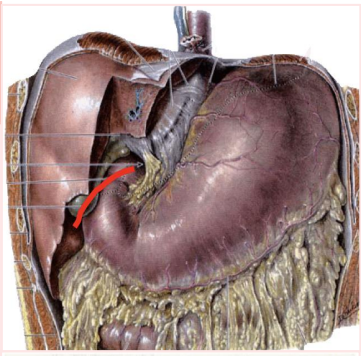
Boundaries

Anterior Wall (From above downwards)	Posterior Wall (From below upwards)
-Caudate lobe of the liver -The lesser omentum -Back of the stomach -Anterior 2 layers of the greater omentum	-Posterior 2 layers of the greater omentum -The transverse colon -Ascending layer of Transverse mesocolon -The upper surface of the pancreas -The left suprarenal gland -The upper end of the left kidney

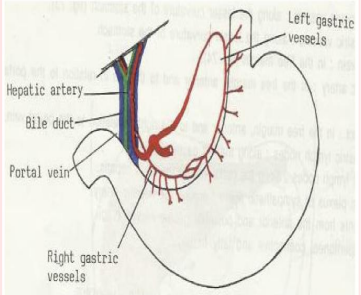
Epiploic foramen (of winslow)

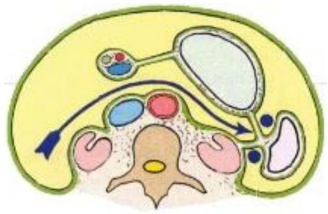
(Females' doctor: this is extremely important)

The epiploic foramen is the communication between the greater and lesser sacs.
It's a vertical slit about 2.5cm bounded by: (boundaries are very important)



In front (anterior):	Free border of the lesser omentum, with its contents: 1. Hepatic artery 2. Common bile duct 3. Portal vein between its two layers
Behind (posterior):	The peritoneum covering the inferior vena cava (IVC).
Above (roof) (superior):	Peritoneum on the caudate process of the liver.
Below (floor) (inferior):	-Peritoneum covering of the: 1. First part of the duodenum 2. Hepatic artery, before ascending between the two layers of the lesser omentum.





Clinical Applications of the Epiploic foramen

Male Slides

Male Dr: Just for your knowledge cuz you're doctors of the future.

Occasionally a loop of intestine passes through the foramen of Winslow into lesser sac and becomes strangulated by the edges of the foramen. Which of the boundaries can be cut to relieve hernia???

[Notice that none of these important boundaries can be incised to release the strangulation; the bowel must be decompressed by a needle to allow its reduction.]

The hepatic artery can be compressed between index finger within the foramen of Winslow and thumb on its anterior wall. If the cystic artery is torn cholecystectomy, hemorrhage can be controlled by this maneuver (named after James Pringle), which then enables damaged vessel to be identified and secured.

Mesentery and ligaments

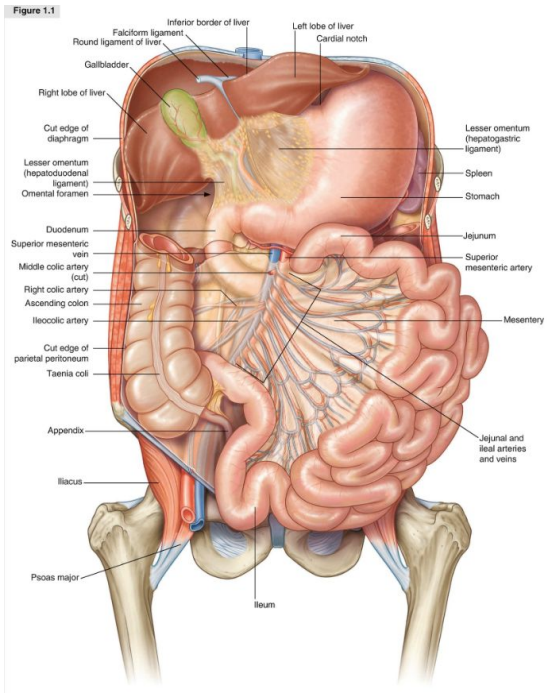
Mesentery Of Small Intestine

Definition:

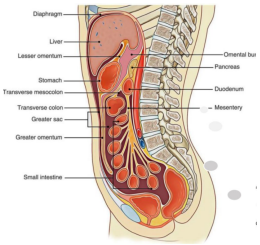
- Two-layered fold of peritoneum suspends the small intestine from the posterior abdominal wall.
- Broad and a fan-shaped.
- Intestinal border: folded, 7m long= Small int. length.

Root of mesentery:

- 15 cm long
- Directed obliquely from duodenojejunal flexure at the level of left side of L2 to the ileocecal junction in the right iliac fossa at the level of right sacroiliac joint



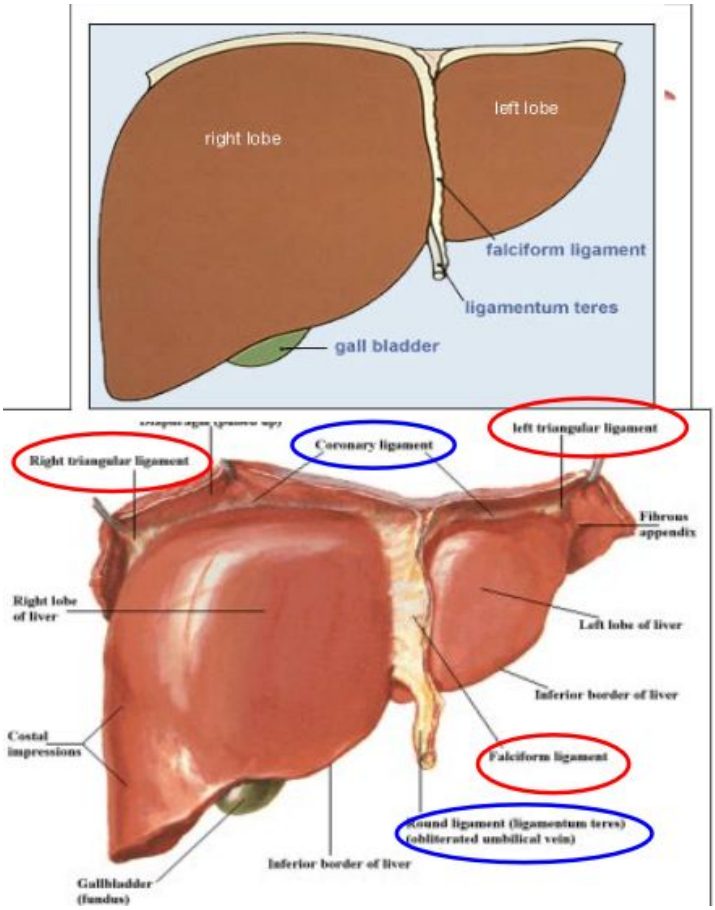
Ligaments

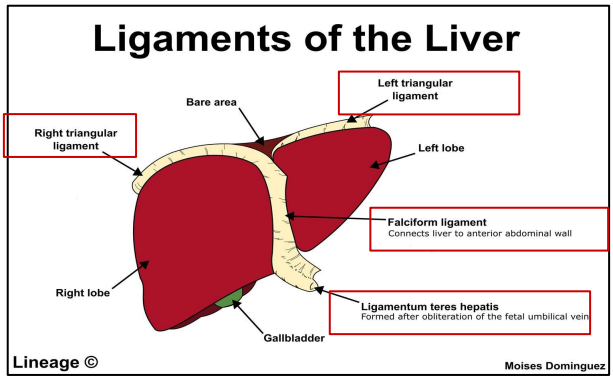


-Two-layered folds of peritoneum that attach organs (liver, stomach & spleen) to the abdominal wall and diaphragm

-Ligaments of Liver:

1. Falciform ligament of liver
2. Coronary ligament
3. Left & Right triangular ligaments
4. Ligamentum Teres





Nerve Supply and Clinical Points of The Peritoneum

Nerve Supply of The Peritoneum

Parietal Peritoneum

(Lines abdominopelvic wall & diaphragm)

- The parietal peritoneum is **sensitive to pain, temperature, touch, and pressure.**

-The **parietal peritoneum lining the anterior abdominal wall** is supplied by :

1- **Lower six Thoracic nerves** (lower 6 intercostal) T7-12 **and L1**(iliohypogastric)nerve.

2-The central part of the **diaphragmatic peritoneum** is supplied by the **phrenic nerves**, C3,4,and 5

3- Peripheral part of the diaphragmatic peritoneum by lower intercostal & Lumbar nerves.

4- Pelvic parietal peritoneum is chiefly by obturator nerve (L2,L3,and L4).

-Applied –referred pain and hyperaesthesia from this area to the tip of the shoulder.

Visceral Peritoneum

- Supplied by **autonomic nerves** that supply the viscera **or** traveling in the mesenteries.

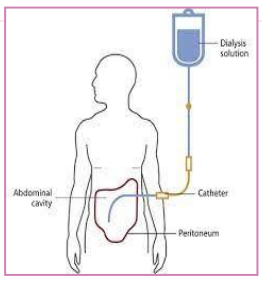
- No Afferent supply.

- Visceral peritoneum is **sensitive only to stretch and tearing.**

- Pain from disease viscera: muscle spasm, ischemia, tension on mesenteries.

Female Slides

Clinical points



Peritoneal Pain (as in Peritonitis)

- From the Parietal Peritoneum: Abdominal pain is somatic type, it is usually sever, and well localized abdominal pain.

- From the Visceral Peritoneum: Including the mesenteries, which is **innervated by autonomic nerves. It is due to Stretch** caused by **over distension of a viscus** and **pulling on a mesentery** that gives rise to the sensation of pain.

Dull aching abdominal pain ألم خفيف بالبطن; poorly localized. (dull, unclear, crampingمغص)

Peritoneal Dialysis:

-Because the pertinuom is semi permeable membrane :

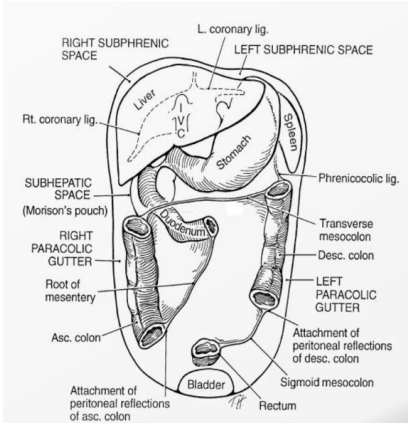
it allows transfer of substances (glucose solution) across itself to remove waste products

It is used in patients with **acute renal insufficiency.**

Peritoneal Compartments

Male Slides

Male Dr: Just for your knowledge cuz you're doctors of the future.



PC is descriptively divided into:

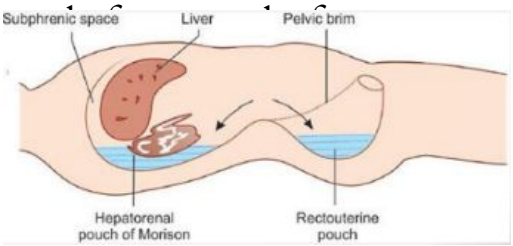
- Supracolic compartments
- Infracolic compartments
- Pelvic compartments

By the attachment of the transverse mesocolon.

The supracolic comp is subdivided into:
Right & left subphrenic spaces by the attachment of the liver to the diaphragm and ant abd wall.
Right subhepatic space or hepatorenal pouch (of Morison) and left subhepatic space (lesser sac)

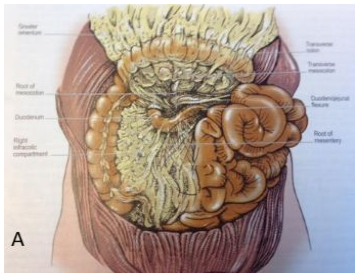
Applied

-In supine, the hepatorenal pouch is the LOWEST part of the PC (except pelvis), peritoneal fluid is likely to accumulate. Infection may perforated appendix or a perforated peptic ulcer



-One or more of these spaces may become filled with pus (a subphrenic abscess) walled off inferiorly by adhesions.
- Left subhepatic space (lesser sac) may fill with fluid as a result of a perforation in the posterior wall of the stomach or from an inflamed or injured pancreas to form a pseudocyst of the pancreas.

Infracolic space (ICS) is divided into right & left ICSs by the attachment of root of the mesentery of small intestine.
- The right paracolic gutter-lateral to ascending colon, pathway for the gravitation of fluid b/w hepatorenal pouch & pelvis.
- Left paracolic gutter, lateral to descending colon, limited above by phrenicocolic ligament.



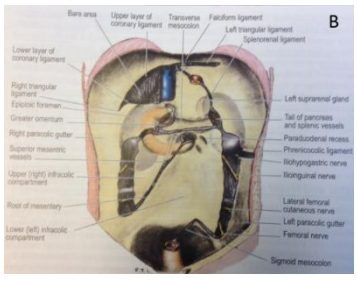


Fig A-IC compartment, greater omentum, transverse mesocolon are lifted up, small intestine pulled to the left.
Fig. B- Attachement of PP to the post abd wall (Last's anatomy 11 ed)Fig. B- Attachement of PP to the post abd wall (Last's anatomy 11 ed)

Peritoneal circulation

Male Slides

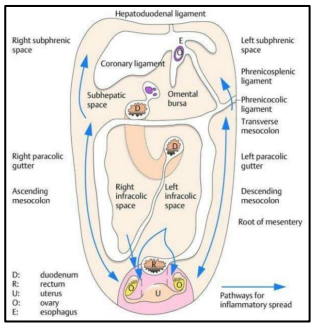
Male Dr: Just for your knowledge cuz you're doctors of the future.

Peritoneal compartments enable the peritoneal cavity to have a normal circulation for peritoneal fluid. In the normal abdomen without intraperitoneal disease, there is a small amount of peritoneal fluid that continuously circulates.

HOW? The movement of fluid in this circulatory pathway is produced by the movement of the diaphragm and peristalsis of bowel

It predominantly flows up the right paracolic gutter which is deeper and wider than the left and is partially cleared by the subphrenic lymphatics.

The total peritoneal blood flow ranges from 50– 150 mL/min
PC contains approximately 100 mL of serous fluid and becomes the dialysate compartment during peritoneal dialysis (PD) from which exchange of solutes with the blood can occur



There are watershed regions in the peritoneal cavity that are areas of fluid stasis:

1 Ileocolic region	2 Root of the sigmoid mesentery
3 Pouch of Douglas	90% of peritoneal fluid is cleared at the subphrenic space by the lymphatics. These lymphatics are connected with lymphatics at the other side of the diaphragm. 4

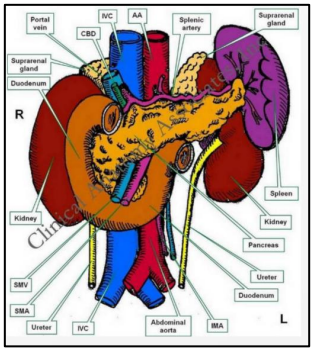
Applied:

1-In staging a patient for gastrointestinal malignancy doctor have to look for disease in these areas of stasis

2-Clearly the surgeons do better in finding subtle disease in these areas.

A useful mnemonic to help in recalling which abdominal viscera are retroperitoneal is: -SAD PUCKER

1. S = Suprarenal (adrenal) Glands
2. A = Aorta/IVC
3. D =Duodenum (except the duodenal cap- first 2cm)
4. P = Pancreas (except the tail)
5. U = Ureters
6. C = Colon (ascending and descending parts)
7. K = Kidneys
8. E = esophagus
9. R = Rectum



Summary from female slides

- The peritoneum is divided into 2 layers:
  - Parietal layer, lines the abdominal and pelvic walls.
  - Visceral layer, covers the abdominal and pelvic organs.
- Omenta are folds of peritoneum.
- Lesser omentum connects the stomach and 1st part of duodenum to the liver.
- Right border of lesser omentum is free and it forms the anterior boundary of epiploic foramen.
- Contents of lesser omentum:
  - Along lesser curvature of stomach: right & left gastric vessels.
  - At the right free border:
    - Hepatic artery.
    - Bile duct.
    - Portal vein.
    - Nerves, lymph vessels & fat.
- Greater omentum: connects the greater curvature of stomach with the transverse colon.
- Contents of greater omentum:
  - Along the greater curvature of stomach:
    - Right & left gastroepiploic vessels.
    - Lymph nodes, vessels & fat.
- Lesser sac of peritoneum (Omental Bursa):
  - Boundaries: Anterior and posterior walls
  - Opening to lesser sac (epiploic foramen):
    - It is a slit-like opening which connect lesser sac with greater sac.
    - Lies behind the lesser omentum.
    - Epiploic foramen is bounded anteriorly by right free margin of lesser omentum.
- Intraperitoneal organs: Are suspended by a mesentery and completely covered by visceral peritoneum.
- Retroperitoneal organs: Are partially covered on one side with parietal peritoneum and Immobile or fixed organs.

MCQs

Q1. Which of the following is not an retroperitoneal organ?			
A. 2nd, 3rd, 4th parts of the duodenum	B. Head, neck, and body of pancreas	C. Tail of pancreas	D. Ascending and descending colon
Q2. The Epiploic foramen is bounded posteriorly by:			
A. The peritoneum covering the inferior vena cava.	B. Hepatic artery	C. Peritoneum on the caudate process of the liver.	D. Common bile duct
Q3. Which of the following is not true about the lesser omentum?			
A. It covers the anterior & posterior surfaces of stomach and 1st part of the duodenum.	B. Attaches the lesser curvature of the stomach to the gallbladder.	C. Its right border is a free margin; constitutes the anterior boundary of the epiploic foramen.	D. The right and left gastric vessels run at its attachment to the stomach
Q4. Which artery lies between the 2 folds of the greater omentum?			
A. Left gastroepiploic artery	B. Left gastric artery	C. Hepatic artery	D. Splenic artery
Q5. Which one of the following is found in the free border of lesser omentum?			
A. Diaphragmatic recess	B. portal vein	C. Superior mesenteric artery	D. Inferior vena cava
Q6. Which one of the following parts of large intestine has a mesentery?			
A. Ascending colon	B. Descending colon	C. Rectum	D. Sigmoid

FOR ANKI FLASHCARDS

OR CLICK HERE

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

Team Leaders

Faris Alzahrani

Salman Althunayan

Norah Almohaimeed

Raseel Almutairi

Team Members

Khalid Alsobei

Faisal Alhejji

Mohammed Alarfaj

Mohammed Alqutub

Aban Basfar

Faisal Alshowier

Sultan Albaqami

Moath Alhudaif

Lama Alsuliman

Aljoharah Alkhalifah

Wafa Alakeel

Sarah Alshahrani

Fatimah Alghamdi

Shahad Alzaid

Reuf Alahmari

Lama Alotaibi

Reem Alomair

Haya Alajmi

Norah Alhazzani

Renad M Alshehri

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Anatomy.med443@gmail.com