

PERITONEUM

The largest serous membrane of the human body; develops from the lateral plates of the mesoderm. Two layers can be distinguished:

- 1. parietal peritoneum**
- 2. visceral peritoneum**

1. Parietal peritoneum makes the inner lining of the abdominal cavity. Different structures covered by peritoneum cause folds of fit.

2. Visceral peritoneum covers abdominal and pelvic viscera.

Organs totally covered (surrounded) by visceral peritoneum are called intraperitoneal organs.

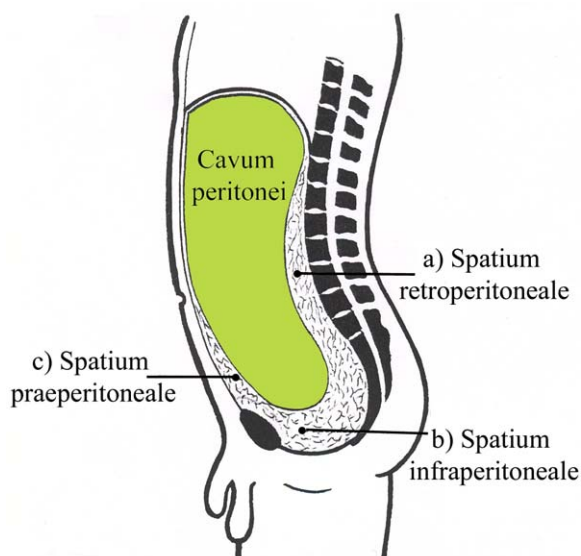
(There is only one „really intraperitoneally” located organ: the ovary - which is situated within the peritoneal cavity.)

Peritoneal cavity: the virtual space between parietal and visceral peritoneal layers (filled with some peritoneal fluid for lubrication – allowing movements of abdominal organs).

In males totally closed sac, in females the peritoneal cavity communicates with the outer world via the oviduct – uterus - vagina.

Abdominal and pelvic organs and structures -according to their peritoneal relations- can be divided into 2 main groups:

- A) Intraperitoneal** (covered by peritoneum) and
- B) Extraperitoneal** (not surrounded by the peritoneum) – within this:
 - a) Retroperitoneal**
 - b) Infraperitoneal**
 - c) Preperitoneal** structures.



Embryology: ventral and dorsal mesenteries (=peritoneal duplicatures in front and behind) surround the developing gut.

Ventral mesentery

The anterior peritoneal duplicature exists only above the umbilical vein. Two parts can be distinguished: **ventral mesogastrium** and **ventral mesoduodenum**.

A) **ventral mesogastrium**

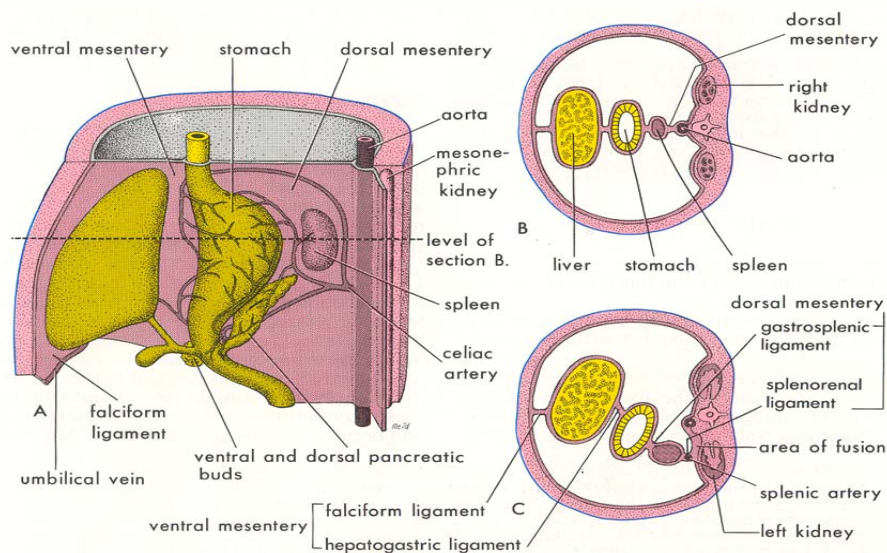
The developing liver divides the ventral mesogastrium into smaller parts. The derivatives of the ventral mesogastrium are:

1. the falciform lig. of the liver (- in the lower edge of it the remnant of the umbilical vein forms the round lig. of the liver).
2. the hepatogastric lig.
- 3-4. right + left coronary ligaments of the liver and left triangular lig. of the liver.

B) **ventral mesoduodenum**

The **ventral mesoduodenum** gives rise to the hepatoduodenal lig.

Lesser omentum is formed by the hepatogastric and hepatoduodenal ligaments.



Dorsal mesentery

The posterior peritoneal duplicature develops in the whole length of the gut tube.

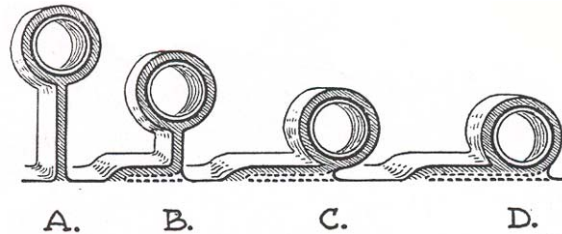
A) **Dorsal mesogastrium**

The developing spleen divides it into:

1. gastrosplenic lig.
2. splenorenal lig. / phrenicosplenic lig. / pancreaticosplenic lig.

The distal part of the duodenum (between the sup. flexure and the duodenojejunal flexure) is originally intraperitoneal (Fig. A), but later becomes retroperitoneal (=secondary retroperitoneal organ).

During the fetal development the ascending and descending colon as well as the upper 1/3 of the rectum fuse with the posterior abdominal wall (Fig. B, C, D), only their anterior part remains peritoneum-covered. These organs can be called **semi-intraperitoneal** organs (Fig.D).



B) From the rest of the dorsal mesentery develop:

1. the greater omentum (4 layers). It later fuses with the 2 layers of the transverse mesocolon => gastrocolic lig. (6 layers).
4. the mesentery
5. the mesoappendix
6. the transverse mesocolon
7. the mesosigmoid

The peritoneal ligaments (usually duplications of peritoneum) contain important structures:

1. **Hepatoduodenal lig.:** portal vein, proper hepatic a., common bile duct
2. **Hepatogastric lig.:** in its lower margin: left + right gastric arteries, coronary vein of the stomach (beginning of it).
3. **Spleorenal lig. / Phrenicosplenic (pancreatosplenic) lig.:** splenic a. + v. (!)
4. **Gastrosplenic lig.:** the beginning of left gastroepiploic a., short gastric arteries (!)
5. **Round lig. of the liver (lig. teres hepatis):** umbilical vein remnant
6. **Gastrocolic lig. and the greater omentum:** right + left gastroepiploic vessels
7. **Root of the mesentery, mesentery:** sup. mesenteric a. + v. (with their branches), lymph nodes and vessels, nerves.

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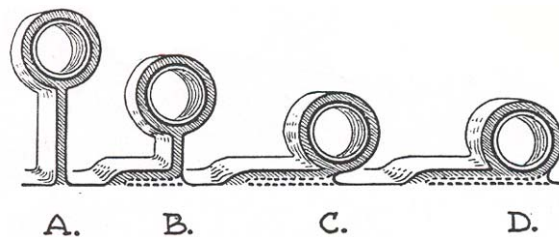
- A) **Intraperitoneal** (covered by peritoneum) and
- B) **Extraperitoneal** (not surrounded by the peritoneum) – within this:
 - a) **Retroperitoneal**
 - b) **Infraperitoneal**
 - c) **Preperitoneal** structures.

A) Intraperitoneal organs:

1. stomach
2. duodenum – sup. horizontal part
3. liver –except bare area (area nuda)
4. spleen
5. jejunum
6. ileum
7. cecum (in some cases), appendix
8. transverse colon
9. sigmoid colon
10. oviduct
11. uterus (body + fundus)

Semi-intraperitoneal organs:

1. cecum (in some cases)
2. ascending colon (Fig. D)
3. descending colon (Fig. D)
4. rectum - upper 1/3 (Fig. D)
5. urinary bladder – when fullfilled
6. post. fornix of vagina



B) Extraperitoneal – within this:

a) Retroperitoneal

Primary retroperitoneal:

1. kidney
2. adrenal gland
3. ureter
4. rectum – middle 1/3

Secunder retroperitoneal (originally intraperitoneal organs during their development later lose their complete peritoneal covering and become retroperitoneal):

1. duodenum – from superior flexure to duodenojejunal flexure
2. pancreas

Retroperitoneal structures also:

1. Abdominal aorta and many of its primary and secondary branches
/e.g.: parietal branches: inf. phrenic a., lumbar arteries, middle sacral a.
paired visceral branches: middle suprarenal a., renal a., gonadal arteries
not primary branches: left gastric a., sup. + inf. pancreaticoduodenal arteries, right colic a. (*Jackson's membrane*), left colic a./
2. Veins: IVC, common iliac veins;
Asc. lumbar veins, azygos/hemiazygos veins (their beginning)
3. Lymphatics: lumbar trunks, the end of the intestinal trunk, cisterna chyli
4. Nerves: lumbar and schiatic plexuses, sympathetic trunk, para- and prevertebral ganglia.

b) Infraperitoneal (primary):

1. urinary bladder (if empty)
2. rectum – lower 1/3
3. prostate
4. seminal vesicles
5. vas deferens
6. cervix of uterus
7. ant. fornix of vagina
8. urethra
9. vagina

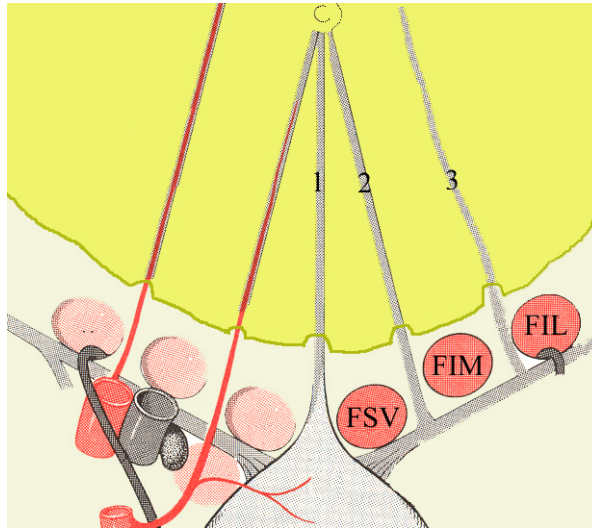
Infraperitoneal structures also

1. Common iliac arteries, ext. iliac a., some branches of int. iliac a.
2. Pelvic venous plexuses
3. Lymphatics: beginning of lumbar trunk; pelvic lymph nodes
4. Nerves: pudendohaemorrhoidal plexus - sacral parasymp. nerves, pelvic autonomic plexuses.

c) Preperitoneal:

The preperitoneal space is located between the anterior parietal peritoneum and the transversalis fascia. Structures situated here cause 5 folds on the parietal peritoneum:

1. median umbilical fold (unpaired) - urachus remnant
2. medial umbilical folds (paired) – remnant of the umbilical artery.
3. lateral umbilical folds (paired) – inf. epigastric a. + v.



FSV: supravesical fossa

FIM: medial inguinal fossa (at the level of the superficial inguinal ring)

FIL: lateral inguinal fossa (deep inguinal ring)

Going downwards, the preperitoneal space gets wider: supravesical and prostatic spaces (and prevesical space of *Retzius*). Via the subarcuate hiatus the deep dorsal vein of penis enters the vesical venous plexus.

Peritoneal ligaments having special name:

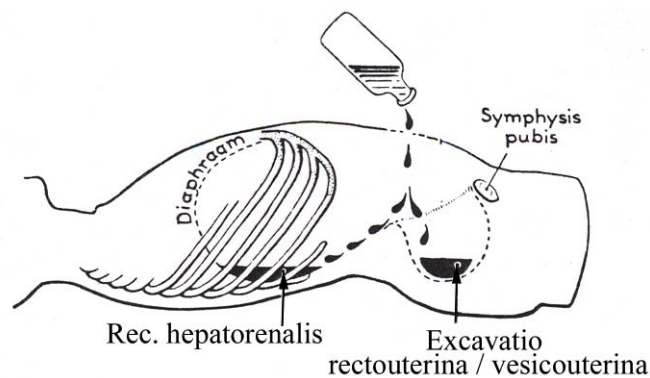
1. hepatorenal lig.
2. duodenorenal lig.
3. splenorenal /lienorenal/ lig. (pancreaticosplenic, phrenicosplenic lig.)
4. phrenicocolic lig. or sustentaculum lienis (= nidus lienis)
5. in female: broad lig. of the uterus (mesometrium, mesosalpinx, mesovarium)

Some **retroperitoneal** structures cause folds on the peritoneum:

1. ureteric fold (ureter)
2. suspensory lig. of the ovary (ovarian vessels)
3. gastropancreatic fold (left gastric a. + coronary vein of the stomach)
4. splenic fold / plica lienalis (splenic a)
5. pancreatic eminence (pancreas)

Peritoneal recesses (potential sites of *internal herniae*):

1. Omental bursa (see later)
2. Duodenocolic recess
3. Hepatophrenic (= subphrenic) recess: the highest point of peritoneal cavity (air, gases can be accumulated here in case of e.g. stomach perforation)
4. Hepatorenal recess (of *Morrison*).
5. Duodenojejunal, sup. + inf. ileocecal, retrocecal, paracolic recesses, intersigmoid, iliac subfascial recess.
6. Rectovesical pouch – in males
7. Rectouterine pouch (*Douglas*): the deepest point of the female abdominal (peritoneal) cavity. Blood (e.g. from extrauterine gravidity!), inflammation fluid can be accumulated here. The *Douglas pouch* can be examined without opening the abdominal wall: by Douglas puncture (via the post. fornix of vagina).
8. Vesicouterine pouch – in female



Omental bursa (or the lesser sac)

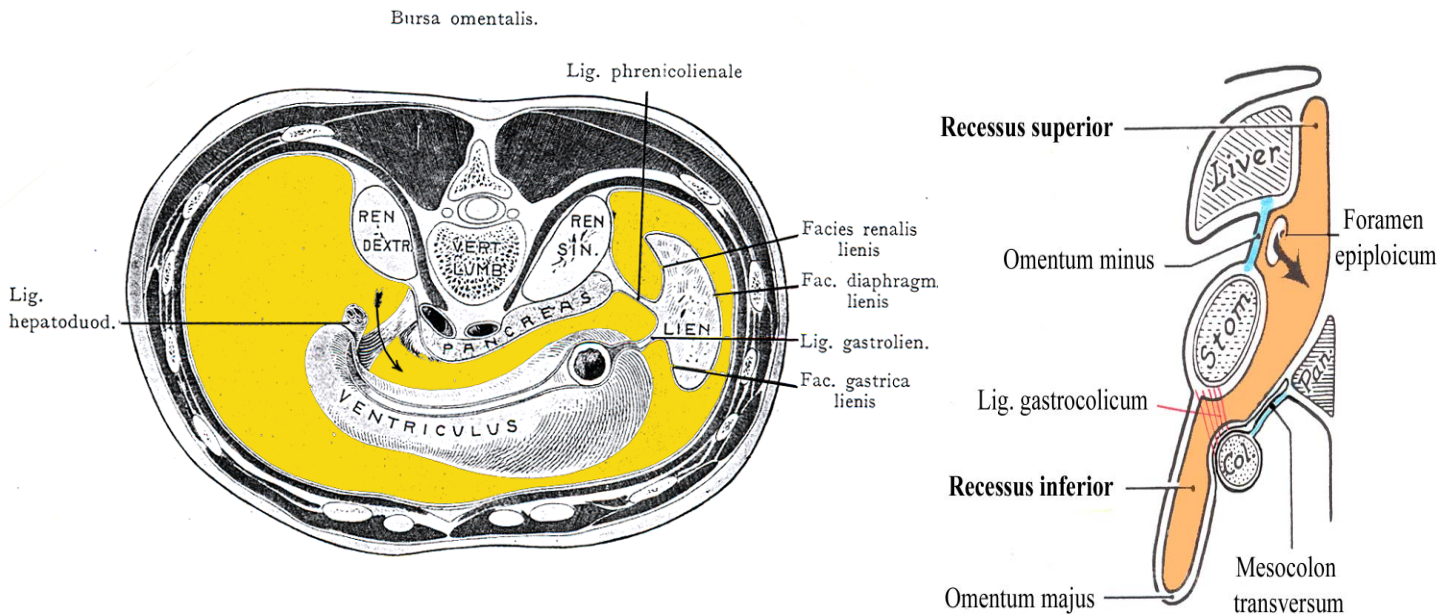
This is a special space of the peritoneal cavity. It is located behind the stomach. In pancreatic surgery the lesser sac should be opened.

Parts:

1. **Epiplioic foramen** (of Winslow): the natural mouth of the omental bursa.
Borders: ant.: hepatoduodenal lig., post.: hepatorenal lig., inf.: duodenorenal lig., sup.: liver (caudate lobe).
2. **Vestibule:** between the epiplioic foramen and the gastropancreatic fold.
3. **Gastropancreatic fold** (or **diaphragma omentale**): the narrowest part of the omental bursa, separating the vestibule from the cavity proper. This fold is formed by the left gastric a. and the coronary vein of the stomach (running behind the peritoneum).
4. **Cavity proper of the omental bursa:**
Borders: ant.: hepatogastric lig., stomach, gastrocolic lig.; inf.: transverse colon + transverse mesocolon; post.: posterior parietal peritoneum + pancreas

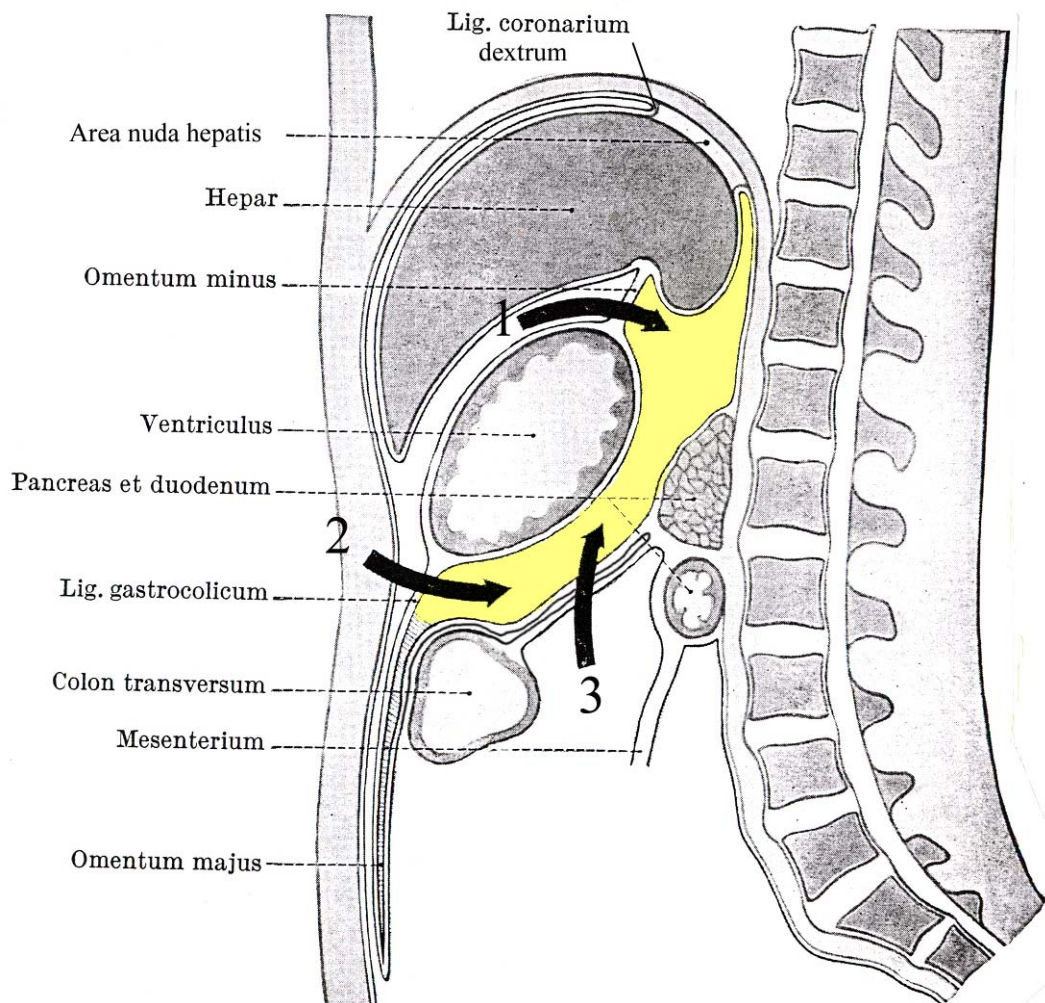
The recesses of the omental bursa:

5. **Omental (or inferior) recess:** exists only in the fetal life, between the 2 (!) duplicatures of the greater omentum. Later this will be obliterated (due to the fusion of the membranes of the greater omentum).
6. **Splenic recess:** on the left side, pointing the hilum of the spleen. Borders: gastrosplenic and phrenicosplenic (splenorenal) ligaments.
7. **Superior recess:** between the liver and the diaphragm.



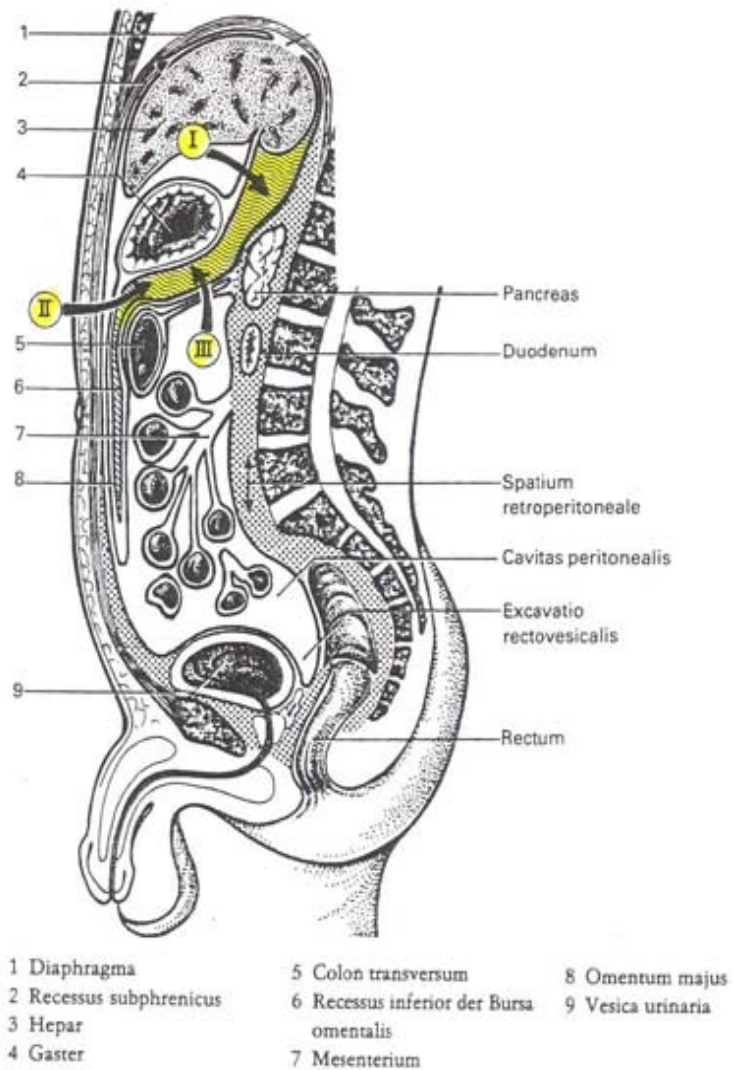
Possible surgical enterings into the omental bursa (e.g. for pancreas surgery):

- 1) Via the lesser omentum
- 2) via the greater omentum
- 3) via the transverse mesocolon



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Punctures of the subphrenic recess:

