MEDICAL EDUCATION RESOURCE

Abdominal Cavity and Peritoneum

? Introduction

- The **abdominal cavity** is the **largest cavity** in the body.
- Extends from the **diaphragm (above)** to the **pelvic inlet (below)**.
- It contains most of the **digestive organs**, **spleen**, and parts of **urogenital organs**.
- Lined by **peritoneum**, a serous membrane that encloses and supports viscera.

Boundaries:

- **Superiorly:** Diaphragm.
- **Inferiorly:** Continuous with pelvic cavity.
- **Anteriorly and laterally:** Muscles of anterior and lateral abdominal wall.
- **Posteriorly:** Lumbar vertebrae and posterior abdominal wall muscles.

?? Nine Regions of the Abdomen

Used for **clinical localization** of organs, pain, and incisions.

Horizontal Planes

1. **Transpyloric Plane:**
    - Midway between suprasternal notch and pubic symphysis.
    - Passes through **L1 vertebra**, **pylorus**, **neck of pancreas**, **hila of kidneys**, and **origin of superior mesenteric artery**.
2. **Transtubercular Plane:**
    - Passes through **tubercles of iliac crests** and **L5 vertebra**.

Vertical Planes

- **Midclavicular lines** (right and left).

Regions (from upper to lower):

1. **Right hypochondriac**
2. **Epigastric**
3. **Left hypochondriac**
4. **Right lumbar (flank)**
5. **Umbilical**
6. **Left lumbar (flank)**
7. **Right iliac (inguinal)**
8. **Hypogastric (pubic)**

9. **Left iliac (inguinal)**

Mnemonic:
? “Hypo–Epi–Hypo / Lum–Umb–Lum / Ili–Hypo–Ili.”

? Peritoneum

- **Definition:** Thin, transparent **serous membrane** lining the abdominal and pelvic cavities.
- Divided into:
  - **Parietal peritoneum:** Lines abdominal wall.
  - **Visceral peritoneum:** Covers organs.

Peritoneal cavity:

- Potential space between parietal and visceral layers.
- Contains a thin film of **serous fluid** for lubrication.
- In males ? completely closed; in females ? communicates with exterior via uterine tubes.

Peritoneal folds:

1. **Mesentery** — double fold connecting small intestine to posterior wall.
2. **Omenta** — peritoneal folds connecting stomach to other organs.
3. **Ligaments** — double layers connecting viscera to viscera or wall.

4. **Fossae and recesses** — small pouches formed by folds.

? Functions of Peritoneum

1. **Lubrication:**
    - Secretes serous fluid ? reduces friction between moving viscera.
2. **Suspension and Support:**
    - Mesenteries and ligaments support organs and transmit blood vessels, nerves, and lymphatics.
3. **Protection:**
    - Greater omentum acts as a **“policeman of the abdomen”**, limiting spread of infection by adhering to inflamed areas.
4. **Absorption:**
    - Rich in blood and lymphatic capillaries; absorbs peritoneal fluid, drugs, and toxins.
5. **Fat Storage:**
    - Especially in **omentum and mesentery**, acts as an energy reserve.
6. **Defence:**
    - Contains **macrophages** and lymphocytes for local immune response.
7. **Pathway for Spread:**

- Fluid, infection, or metastasis can spread along peritoneal reflections.

?? Clinical Anatomy

1. Ascites:

- Abnormal accumulation of fluid in the peritoneal cavity due to **cirrhosis**, **portal hypertension**, or **hypoproteinemia**.

2. Peritonitis:

- Inflammation due to infection (e.g., ruptured appendix, perforated ulcer).
- Causes **acute abdomen**, **rigid wall**, **pain**, and **fever**.
- May become **generalized** or **localized (subphrenic abscess)**.

3. Peritoneal adhesions:

- Fibrous bands between visceral and parietal layers following inflammation or surgery ? cause **intestinal obstruction**.

4. Subphrenic abscess:

- Localized pus beneath the diaphragm, often after **appendicitis** or **hepatic infection**.

5. Intraperitoneal vs Retroperitoneal organs:

- Intraperitoneal ? completely covered by peritoneum (stomach, liver, jejunum).
- Retroperitoneal ? partially covered (kidneys, pancreas, duodenum).

6. Peritoneal dialysis:

- Exchange of solutes across peritoneum in renal failure; peritoneum acts as a **semipermeable membrane**.

7. Paracentesis abdominis:

- Aspiration of ascitic fluid through the abdominal wall.
- Safe site: **Midline below umbilicus** or **lateral to rectus sheath**.

8. Peritoneal recesses:

- Small pouches where infection or pus may collect — **subhepatic, paracolic, and pelvic recesses**.

9. Pneumoperitoneum:

- Presence of free gas in the peritoneal cavity — usually due to **perforated hollow viscus** (gas under diaphragm on X-ray).

Peritoneal Folds

- The **peritoneum**, when reflected from the body wall to viscera or between viscera, forms **folds** that suspend organs and transmit vessels, nerves, and lymphatics.

Types of Peritoneal Folds

1. **Omenta** ? connect stomach to other viscera.
2. **Mesenteries** ? connect intestines to posterior abdominal wall.

3. **Ligaments** ? connect viscera to viscera or wall (e.g. falciform ligament).

4. **Fossae and recesses** ? small pouches between folds.

Each fold consists of **two layers of peritoneum** enclosing **connective tissue, fat, blood vessels, lymphatics, and nerves.**

? Greater Omentum

- **Definition:** A large, apron-like peritoneal fold hanging from the **greater curvature of stomach** and **first part of duodenum**, covering the **intestines**.

Attachments

- **Superiorly:** Greater curvature of stomach and 1st part of duodenum.
- **Inferiorly:** Hangs down in front of small intestines, then turns upward to attach to the **transverse colon** and its **mesocolon**.

Structure

- Consists of **four layers** of peritoneum:
    - Formed by the double layer descending from the stomach ? turns upward in front of the transverse colon ? fuses with its mesocolon.

Contents

- Fat, lymphatics, gastroepiploic vessels, and macrophages.

Functions

1. Acts as **“abdominal policeman”** – migrates to inflamed organs to wall off infection.
2. Provides **protection and insulation** for abdominal viscera.
3. Acts as **fat reservoir**.
4. Limits spread of peritonitis.

? Dissection Notes for Greater Omentum

- Reflect the omentum upwards to expose:
  - **Transverse colon** and **small intestines**.
  - Note that **stomach** lies behind the omental curtain.
  - Observe the **four-layered fold** and the **gastrosplenic ligament** at its left border.

? Lesser Omentum

- A double-layered peritoneal fold connecting **lesser curvature of stomach** and **first part of duodenum** to **liver**.

Attachments

- **Superior border:** Fissure for ligamentum venosum and porta hepatis of liver.
- **Inferior border:** Lesser curvature of stomach and 1st part of duodenum.

Divisions

1. **Hepatogastric ligament** – between liver and stomach.
2. **Hepatoduodenal ligament** – between liver and duodenum; forms **anterior wall of epiploic foramen**.

Contents (within free right border):

- **Hepatic artery proper** (left).
- **Bile duct** (right).
- **Portal vein** (posterior).

Mnemonic: *Duct right, artery left, vein behind.*

Functions

- Connects liver with stomach and duodenum.
- Transmits portal triad structures.
- Separates **greater and lesser sacs** of peritoneal cavity.

? Mesentery

- A fan-shaped peritoneal fold connecting **coils of jejunum and ileum** to the **posterior abdominal wall**.

Root of the Mesentery

- **Length:** About 15 cm.
- **Direction:** Oblique — from **duodenojejunal flexure (left of L2)** to **ileocecal junction (right sacroiliac joint)**.
- **Length of free border:** 6 meters (supports small intestine).

Contents

- Branches of **superior mesenteric artery and vein**.
- Lymph nodes and lacteals.
- Nerves and fat.

Functions

- Provides **mobility and vascular support** to small intestine.
- Acts as **pathway for vessels and lymphatics**.

> **? Mesoappendix**

- A triangular peritoneal fold connecting **appendix** to the **mesentery of the terminal ileum** .
- Contains the **appendicular artery and vein** (branch of ileocolic artery).

Clinical significance:

- Site of **inflammation in appendicitis**; artery may thrombose during infection causing **gangrene of appendix**.

? Dissection Notes for Mesentery and Mesoappendix

1. Lift coils of small intestine ? identify the **fan-shaped mesentery** attaching to posterior abdominal wall.
2. Trace the **superior mesenteric vessels** within the root.
3. Identify the **appendix** and its **mesoappendix** extending from terminal ileum.
4. Note presence of **appendicular artery** (lies close to free edge).

?? Clinical Anatomy of Peritoneal Folds

- **Omental adhesions:** Occur post-surgery or infection, may cause intestinal obstruction.
- **Internal hernias:** May occur through **defects in mesentery** or **foramen of Winslow**.
- **Epiploic foramen (of Winslow):** Communication between greater and lesser sacs — bounded by:
    - **Anteriorly:** Hepatoduodenal ligament.
    - **Posteriorly:** IVC.
    - **Superiorly:** Caudate lobe of liver.
    - **Inferiorly:** 1st part of duodenum.

- **Foramen of Winslow occlusion test (Pringle maneuver):** Compression of hepatoduodenal ligament to control hepatic bleeding.

? Transverse Mesocolon

Definition

- A **broad peritoneal fold** that connects the **transverse colon** to the **posterior abdominal wall**.
- It divides the **peritoneal cavity** into **supracolic** and **infracolic compartments**.

Attachments

- **Superior border:** Attached to **anterior surface of pancreas**.
- **Inferior border:** Attached to **transverse colon**.
- **Root:** Extends horizontally across the posterior abdominal wall, passing:
    - From **right kidney** ? across **2nd part of duodenum** ? to **left kidney**.

Contents

- **Middle colic vessels** (from superior mesenteric artery and vein).
- **Lymphatics** and **autonomic nerves**.
- **Fat and connective tissue**.

Function

- Provides mobility to the transverse colon and acts as a **pathway for vessels**.
- Divides peritoneal cavity for **clinical localization of infections**.

? Dissection Notes – Transverse Mesocolon

1. Reflect the **greater omentum** upward to expose the **transverse colon**.
2. Lift the colon gently ? observe the **posterior attachment (root)** of the mesocolon to the pancreas.
3. Identify the **middle colic artery and vein** between the two layers.
4. Note continuity of the **greater omentum** with the transverse mesocolon.

? Sigmoid Mesocolon

Definition

- A **triangular peritoneal fold** connecting the **sigmoid colon** to the **posterior pelvic wall**.

Root of Sigmoid Mesocolon

- **Shape:** Inverted “V”
- **Apex:** Over the **bifurcation of left common iliac artery**.
- **Right limb:** Along **sacral promontory**.

- **Left limb:** Along the **medial border of left psoas major** and **pelvic brim**.

Contents

- **Sigmoid branches of inferior mesenteric artery and vein**.
- **Lymphatics and nerves**.
- **Fat and connective tissue**.

Function

- Suspends the sigmoid colon, allowing **mobility for defecation**.
- Serves as a **conduit for vessels**.

? Dissection Notes – Sigmoid Mesocolon

1. Retract small intestine to right.
2. Identify the **loop of sigmoid colon** in the left iliac fossa.
3. Lift the sigmoid loop ? observe **fan-shaped sigmoid mesocolon**.
4. Trace the **inferior mesenteric vessels** within its layers.

? Reflection of Peritoneum

General Pattern

- The **parietal peritoneum** reflects from the abdominal wall to cover viscera, forming **ligaments, mesenteries, and omenta**.
- Reflections create **peritoneal pouches** and **recesses** between organs.

Major Reflections

1. **From diaphragm to liver** ? *Falciform, coronary, and triangular ligaments.*
2. **From stomach to other organs** ? *Greater and lesser omenta, gastrosplenic and gastrophrenic ligaments.*
3. **From small and large intestine to posterior wall** ? *Mesentery, transverse mesocolon, sigmoid mesocolon.*
4. **From anterior abdominal wall to bladder and uterus (in females)** ? *Vesicouterine and rectouterine pouches.*

Clinical Significance

- Sites of **peritoneal fluid accumulation** in disease (e.g., subphrenic space, rectouterine pouch).
- Important in **surgical approaches** to retroperitoneal organs.

? Peritoneal Cavity

Definition

- A **potential space** between the **parietal** and **visceral layers** of peritoneum, containing a thin film of lubricating fluid.

Divisions

1. **Greater Sac**
    - Main and larger part of the cavity.
    - Divided into:
        - **Supracolic compartment** ? contains stomach, liver, spleen.
        - **Infracolic compartment** ? contains small intestine, ascending & descending colon.
        - These compartments are separated by the **transverse mesocolon**.
2. **Lesser Sac (Omental Bursa)**
    - Posterior to stomach and lesser omentum.
    - Communicates with greater sac via **epiploic (omental) foramen**.

Peritoneal Recesses

- **Subphrenic space** (beneath diaphragm).
- **Subhepatic (Morrison’s pouch)** – common site for pus or fluid collection.
- **Paracolic gutters** (lateral to ascending and descending colon).
- **Pelvic pouches** – *rectovesical* (males), *rectouterine* (females).

Functions

- Allows **free movement of viscera**.
- Serves as a **lubricated environment** for digestion and absorption.
- Acts as a **pathway for infection, metastasis, and fluid spread**.

?? Clinical Anatomy

- **Subphrenic abscess:** Accumulation of pus beneath diaphragm.
- **Morrison’s pouch fluid:** Seen in supine patients with peritonitis or liver abscess.
- **Pelvic abscess:** Settles in lowest pouch (rectouterine/rectovesical).
- **Internal hernia:** May occur into recesses near duodenum or cecum.
- **Ascitic fluid flow:** Moves between supracolic and infracolic compartments depending on posture.
- **Pneumoperitoneum:** Air under diaphragm due to perforated hollow organ.

? Vertical (Sagittal) Tracing of Peritoneum

A vertical or sagittal tracing is made in the **midline**, showing how the peritoneum reflects from the anterior abdominal wall onto viscera and posterior wall.

Course of the Peritoneum (Mid-Sagittal Plane)

1. Begins on the **posterior surface of the anterior abdominal wall** below the **xiphoid process**.

2. Passes backward over the **anterior surface of the liver** to the **superior surface**, forming the **falciform ligament**.

3. Reflects from the **posterior surface of the liver** to the **diaphragm** as the **coronary and triangular ligaments**.

4. Descends to enclose the **stomach** (forming its anterior and posterior peritoneal layers).

5. From the **greater curvature** of the stomach, it descends as the **greater omentum**, then turns upward to the **transverse colon** and **transverse mesocolon**.

6. From the **posterior abdominal wall**, it passes forward to cover **coils of small intestine** and then reflects again onto the wall.

7. In the **pelvis**, it covers the **urinary bladder**, forms **pouches**, and reflects onto the **rectum**.

? Horizontal Tracing above the Transverse Colon

A horizontal section at the level of the **upper abdomen** shows peritoneal relations of stomach, liver, and spleen.

Tracing

1. **Anteriorly:** Parietal peritoneum lines the anterior abdominal wall.

2. **Superiorly:** Reflects onto the **inferior surface of the diaphragm**.

3. **On the right side:** Covers the **inferior surface of the liver**, forming the **coronary ligament** and the **hepatorenal pouch** (Morrison's pouch).
4. **In the midline:**
    - Encloses the **stomach** — anterior and posterior surfaces covered.
    - Forms **lesser omentum** between stomach and liver.
    - Forms **greater omentum** from greater curvature.
5. **On the left side:** Covers **spleen**, **gastrosplenic**, and **splenorenal ligaments**.
6. **Posteriorly:** Covers the **pancreas** and **posterior abdominal wall** structures.

Compartments visible:

- **Supracolic compartment:** Above the transverse mesocolon, containing stomach, liver, spleen.
- **Subphrenic spaces:** Right and left, separated by falciform ligament.

? Horizontal Tracing below the Level of the Transverse Colon

This tracing shows the peritoneal disposition around the **small and large intestines** (infracolic compartment).

Tracing

1. The **transverse mesocolon** divides the cavity; below it lies the **infracolic compartment**.
2. **Right infracolic compartment:** Between mesentery and ascending colon.

3. **Left infracolic compartment:** Between mesentery and descending colon.
4. Both communicate inferiorly with the **pelvic peritoneum**.
5. The **paracolic gutters** (lateral to ascending and descending colon) serve as pathways for **fluid spread** between pelvis and subphrenic regions.
6. Peritoneum covers:
    - **Small intestine** completely (jejunum and ileum).
    - **Cecum** partially, often with a **mesocecum**.
    - **Ascending and descending colon** — only anterior and lateral surfaces (retroperitoneal).

Clinical note:

- Infections may move freely through **right paracolic gutter** (continuous with Morrison's pouch) and collect in **pelvic recesses**.

> **?? Horizontal Tracing of Peritoneum in the Lesser/True Pelvis (Male)**

Course

1. From the **anterior abdominal wall**, the peritoneum descends onto the **superior surface of the urinary bladder**.
2. When the bladder is empty, it reaches the level of the **pubic symphysis**; when full, it rises above it.

3. Reflects from the bladder to the **anterior surface of the rectum**, forming the **rectovesical pouch** (lowest part of the peritoneal cavity in males).

4. Covers the **upper one-third of the rectum** and then reflects backward onto the **sacrum**.

Important Spaces

- **Rectovesical pouch:** Between bladder and rectum ? lowest point for pus/fluid in the male peritoneal cavity.
- **Pararectal fossae:** On each side of the rectum.

?? Horizontal Tracing of Peritoneum in the Lesser/True Pelvis (Female)

Course

1. From the **anterior abdominal wall**, peritoneum covers the **superior surface of the urinary bladder**.

2. Passes backward onto the **anterior surface of the uterus**, forming the **vesicouterine pouch**.

3. Then reflects over the **fundus and posterior surface of the uterus** onto the **upper part of vagina** and **anterior surface of the rectum**, forming the **rectouterine pouch (pouch of Douglas)**.

4. Covers the **broad ligaments** of uterus on either side, enclosing uterine tubes and ovaries (partly).

Important Pouches

- **Vesicouterine pouch:** Between bladder and uterus.
- **Rectouterine pouch (Douglas):** Between uterus and rectum — **lowest point** in the female peritoneal cavity.

Clinical Importance

- **Douglas pouch tap (culdocentesis):** Fluid from pelvic peritonitis or ruptured ectopic pregnancy can be aspirated here.
- Infections or blood may collect due to gravity in this pouch.

?? Applied Anatomy Summary

- **Right paracolic gutter:** Pathway for spread of subhepatic infection to pelvis.
- **Left paracolic gutter:** Limited by **phrenicocolic ligament**, preventing upward spread.
- **Morrison’s pouch (hepatorenal recess):** Common site for pus or fluid in supine patients.
- **Pelvic pouches (male or female):** Lowest dependent areas for abscess formation.
- **Rectouterine pouch (Douglas):** Clinically accessed through posterior fornix for drainage.
- **Rectovesical pouch:** Fluid collects here in males when supine.

? Epiploic Foramen (Omental Foramen / Foramen of Winslow)

Definition

- The **epiploic foramen** is the **natural communication** between the **greater sac** and **lesser sac** (omental bursa) of the peritoneal cavity.
- It allows the passage of **structures of the portal triad** and permits **movement of peritoneal fluid** between compartments.

Situation

- Lies **posterior to the free right border of the lesser omentum** (hepatoduodenal ligament).
- Positioned **behind the right margin of the stomach** and **in front of the inferior vena cava**.

Boundaries

BOUNDARY	STRUCTURE
Anterior	Free border of lesser omentum containing **portal triad** (bile duct, hepatic artery, portal vein).
Posterior	**Inferior vena cava**, covered by peritoneum.
Superior	**Caudate process of liver**.
Inferior	**First part of duodenum**.

Mnemonic: *“A VIP Doorway” ? Anterior: Vein-Portal triad, Inferior: Duodenum, Posterior: IVC, Superior: Process (Caudate).*

Clinical Importance

1. **Pringle’s Maneuver:**
    - During liver surgery, **hepatic bleeding** can be controlled by compressing the **hepatoduodenal ligament** across the foramen ? occludes hepatic artery and portal vein.
2. **Internal Hernia:**
    - Small intestine loops may enter the lesser sac through this foramen, leading to **strangulated hernia**.
3. **Spread of Infection:**
    - Pathological fluid or pus can pass between **lesser sac** and **greater sac** through this foramen.

? Lesser Sac (Omental Bursa)

Definition

- The **lesser sac** is a **peritoneal recess** situated **posterior to the stomach and lesser omentum**.
- It allows **free movement of the stomach** and acts as a **potential space** for infection or fluid accumulation.

Situation

- Lies **behind the stomach**, **lesser omentum**, and **left lobe of liver**.

- Communicates with **greater sac** via the **epiploic foramen** on the right side.

Boundaries

WALL	STRUCTURES FORMING THE WALL
Anterior wall	Lesser omentum, posterior surface of stomach, anterior layer of greater omentum.
Posterior wall	Peritoneum covering pancreas, left kidney, left suprarenal gland, and transverse mesocolon.
Superior wall	Caudate lobe of liver and diaphragm.
Inferior wall	Fusion of layers of greater omentum with transverse mesocolon.
Left margin	Spleen, gastrosplenic ligament, and splenorenal ligament.
Right margin	Opens into greater sac via **epiploic foramen**.

Recesses of Lesser Sac

1. **Superior recess:** Between diaphragm and caudate lobe of liver.
2. **Inferior recess:** Extends downward between layers of greater omentum (often obliterated in adults).
3. **Splenic recess:** Extends toward spleen between gastrosplenic and splenorenal ligaments.

Clinical Anatomy

- **Abscess formation:** Infections posterior to the stomach may form **subhepatic or lesser sac abscess**.
- **Perforation of posterior gastric ulcer:** Gastric contents may enter the **lesser sac**, causing peritonitis.
- **Pancreatic pseudocyst:** Pancreatic secretions may collect in the lesser sac through ruptured posterior wall of the pancreas.
- **Surgical approach:** The lesser sac is reached by **dividing the gastrocolic ligament** (part of the greater omentum).

? Special Regions of the Peritoneal Cavity

The peritoneal cavity is subdivided into **compartments and recesses** that determine **fluid movement and abscess localization**.

? Supracolic Compartment (Above Transverse Mesocolon)

Contents

- **Liver, stomach, spleen, and upper duodenum.**

Spaces

1. **Right subphrenic space:** Between right dome of diaphragm and liver.
2. **Left subphrenic space:** Between left dome of diaphragm and spleen/stomach.

3. **Subhepatic space:** Between inferior surface of liver and transverse colon.

Clinical Note:

- **Subphrenic abscess** or **subhepatic abscess** can follow peritonitis, appendicitis, or cholecystitis.

? Hepatorenal Pouch (Morrison's Pouch)

- A deep recess of **subhepatic space** between the **right kidney** and **posterior surface of liver**.
- It is the **lowest part of the supracolic compartment** in the **supine position**.

Clinical importance:

- Fluid or pus from the peritoneal cavity tends to collect here.
- Visible on **ultrasound or CT scan** in cases of peritonitis or ascites.

? Infracolic Compartments (Below Transverse Mesocolon)

Divisions

- Divided into **right and left infracolic spaces** by the **mesentery of small intestine**.
    - **Right infracolic space:** Lies between mesentery and ascending colon.
    - **Left infracolic space:** Between mesentery and descending colon.

Contents

- **Jejunum, ileum, ascending and descending colon.**

Communication:

- Both infracolic compartments open inferiorly into the **pelvic cavity**, allowing free flow of ascitic fluid.

? Paracolic Gutters

- Longitudinal channels between **lateral borders of colon** and **posterior abdominal wall**.

Types

1. **Right paracolic gutter:** Between ascending colon and abdominal wall.
    - **Wide and deep**, communicates with **Morrison's pouch** and **pelvic cavity**.
    - Major route for **spread of infection** between pelvis and subhepatic region.
2. **Left paracolic gutter:** Between descending colon and abdominal wall.
    - **Shallow**, limited superiorly by **phrenicocolic ligament** (supports spleen).
    - Restricts upward spread of infection.

?? Clinical Anatomy Summary

- **Fluid movements:**
  - In **supine patients**, fluid accumulates in **Morrison’s pouch**.
  - In **erect posture**, it collects in **pelvic pouches** (rectovesical or rectouterine).
- **Subphrenic abscess:** Pus beneath diaphragm — may irritate **phrenic nerve**, causing **shoulder pain**.
- **Internal hernia:** May occur into **lesser sac** through epiploic foramen.
- **Perforated ulcer:** Gastric contents may enter **lesser sac**.
- **Pancreatic leakage:** Leads to **lesser sac pseudocyst**.

? Rectouterine Pouch (Pouch of Douglas)

Definition

- The **lowest part of the peritoneal cavity in females**, situated **between the uterus and the rectum**.
- Formed by a **downward reflection of peritoneum** from the posterior surface of uterus and upper vagina onto the anterior surface of rectum.

Boundaries

- **Anterior:** Posterior wall of uterus and upper part of posterior vaginal fornix.
- **Posterior:** Anterior surface of rectum.
- **Lateral:** Uterosacral ligaments.
- **Floor:** Formed by peritoneum over the posterior vaginal fornix.

Extent

- Extends about **6–8 cm** above the vaginal opening; deepest peritoneal recess in the female pelvis.

Relations

- **Superiorly:** Posterior fornix of vagina.
- **Inferiorly:** Rectum.
- **Laterally:** Broad ligaments and uterosacral folds.

?? Clinical Anatomy of Pouch of Douglas

1. **Lowest dependent point** ? Fluid, pus, or blood collects here in **erect posture**.
2. **Culdocentesis:**
    - Aspiration of fluid through **posterior vaginal fornix** to confirm pelvic peritonitis, ruptured ectopic pregnancy, or hemoperitoneum.
3. **Pouch of Douglas abscess:** May follow pelvic inflammatory disease.

4. **Rectouterine pouch obliteration:** Seen in endometriosis or chronic pelvic infections.
5. **Douglas' pouch hernia (enterocoele):**
    - Herniation of intestinal loop into the pouch, often following childbirth or weakness of pelvic floor.

? Peritoneal Fossae (Recesses)

Small peritoneal pouches formed by folds and reflections — potential sites for internal hernias or localized collections.

1. Duodenal Recesses

- **Superior duodenal recess:** Above the duodenojejunal flexure; bounded by superior duodenal fold.
- **Inferior duodenal recess:** Below the flexure; bounded by inferior duodenal fold.
- **Paraduodenal recess:** Left of duodenojejunal flexure; contains **inferior mesenteric vein** in its fold — **common site for internal hernia**.
- **Retroduodenal recess:** Behind the flexure; variable in size.

2. Ileocecal Fossae

- **Superior ileocecal recess:** Above the junction of ileum and cecum.
- **Inferior ileocecal recess:** Below the junction; bounded by vascular fold of ileocecal artery.
- **Retrocecal recess:** Behind cecum; **appendix commonly lies here**.

- **Paracecal recess:** Lateral to cecum; communicates with right paracolic gutter.

3. Inter-sigmoid Fossa

- Found at root of sigmoid mesocolon; contains **left ureter** on its floor.

4. Intersigmoid and Pelvic Recesses

- Formed by peritoneal folds in the pelvis, adjacent to bladder and rectum.

?? Clinical Anatomy of Peritoneal Fossae

- **Internal hernias** may occur through duodenal, paraduodenal, or ileocecal recesses.
- **Paraduodenal hernia:** Dangerous because **inferior mesenteric vein** lies in the fold — risk of injury during surgery.
- **Retrocecal appendix:** May cause **atypical appendicitis pain** (flank or back).
- **Pelvic recess abscesses:** Common after pelvic inflammatory disease or perforated bowel.

? Development of Gut and Its Folds

Primitive Gut Division

- Derived from **endoderm-lined yolk-sac portion** incorporated during folding of embryo.
- Divided into:

1. **Foregut:** From buccopharyngeal membrane to second part of duodenum.
2. **Midgut:** From distal half of duodenum to two-thirds of transverse colon.
3. **Hindgut:** From distal one-third of transverse colon to cloacal membrane.

Formation of Peritoneal Folds

- As gut tube elongates, it remains suspended by **dorsal mesentery** throughout and **ventral mesentery** in foregut region only.
- Later differentiation produces:
  - **Omenta** ? from ventral mesogastrium (lesser omentum) and dorsal mesogastrium (greater omentum).
  - **Ligaments** ? falciform ligament, gastrosplenic and splenorenal ligaments.
  - **Mesenteries** ? mesentery of small intestine, transverse and sigmoid mesocolons.

Rotation and Fixation

- **Midgut rotates 270° counter-clockwise** around **superior mesenteric artery**, placing:
  - Jejunum & ileum centrally,
  - Cecum in right lower quadrant,
  - Colon ascending and descending secondarily retroperitoneal.
- **Fusion of peritoneal layers** causes fixation of ascending and descending colon to posterior wall (no mesentery).

Clinical Significance

- Errors in rotation ? **malrotation, volvulus, or internal hernias**.
- Persistent dorsal mesentery ? **mobile cecum or mobile colon**.
- Persistence of vitelline duct (yolk-stalk) ? **Meckel's diverticulum**, may ulcerate or bleed.
- Abnormal omental fusion ? internal hernial pouches.

Summary for Viva

- **Pouch of Douglas** ? lowest peritoneal space in female, accessed by culdocentesis.
- **Rectovesical pouch** ? male counterpart.
- **Fossae** ? sites for internal hernia.
- **Midgut rotation (270°)** ? defines adult intestinal arrangement.

> **? Facts to Remember**

- The **peritoneum** is the largest serous membrane of the body, forming a **closed sac in males** and an **open sac in females** (communicating via the uterine tubes).
- The **peritoneal cavity** is a **potential space** containing lubricating serous fluid, allowing free movement of viscera.
- **Greater sac** and **lesser sac (omental bursa)** are the two major subdivisions of the peritoneal cavity.

- **Epiploic foramen (Foramen of Winslow)** is the **only natural communication** between these two sacs.
- The **portal triad** (bile duct, hepatic artery, portal vein) lies in the **anterior wall** of the epiploic foramen within the **hepatoduodenal ligament**.
- **Greater omentum** hangs from the greater curvature of the stomach and acts as the **policeman of the abdomen** by localizing infections.
- **Lesser omentum** connects the stomach and duodenum to the liver; it transmits the portal triad.
- **Mesentery** suspends small intestine and contains branches of the **superior mesenteric artery and vein**.
- **Transverse mesocolon** divides the peritoneal cavity into **supracolic** and **infracolic compartments**.
- **Paracolic gutters** act as **channels for fluid movement** between pelvis and subphrenic spaces.
- **Morrison's pouch (hepatorenal recess)** is the **lowest part of the supracolic compartment** when supine.
- In females, the **pouch of Douglas (rectouterine pouch)** is the **lowest part of the peritoneal cavity** when erect.
- **Subphrenic abscess** may irritate the **phrenic nerve**, leading to **referred shoulder pain**.
- **Paraduodenal recess** is the **commonest site of internal hernia**, containing the **inferior mesenteric vein**.

- **Peritoneal folds and ligaments** develop from **ventral and dorsal mesenteries** of the embryonic gut.
- The **midgut rotates 270° anticlockwise** around the **superior mesenteric artery** during development.
- **Fusion fascia** fixes the ascending and descending colon to the posterior abdominal wall.
- **Meckel's diverticulum** represents persistence of the **vitelline duct** — located on antimesenteric border of ileum.
- **Peritoneal dialysis** uses the **semipermeable property** of peritoneum for removal of waste products in renal failure.
- **Ascitic fluid** follows gravity-dependent spaces: Morrison's pouch (supine) and pelvic pouches (erect).

?? Clinicoanatomical Problems

1. **A patient presents with dull, aching pain in right shoulder following liver abscess.**
   ? Due to **irritation of phrenic nerve** from **subphrenic abscess** beneath diaphragm.
2. **In a supine patient with peritonitis, where does pus first collect?**
   ? In the **hepatorenal pouch (Morrison's pouch)** — the lowest point in this position.
3. **In an erect female patient, where does peritoneal fluid accumulate?**
   ? In the **rectouterine pouch (Pouch of Douglas)**.
4. **A posterior gastric ulcer perforates — where will the gastric contents go?**
   ? Into the **lesser sac (omental bursa)**.

5. **A loop of intestine herniates behind the stomach. What is the route?**
   ? Through the **epiploic foramen** into the **lesser sac** (internal hernia).

6. **During hepatic surgery, bleeding is controlled by clamping the hepatoduodenal ligament. What is this called?**
   ? **Pringle's maneuver**, which occludes hepatic artery and portal vein.

7. **A newborn presents with intestinal obstruction due to malrotation.**
   ? Results from **failure of normal 270° rotation** of midgut loop around superior mesenteric artery.

8. **Internal hernia through paraduodenal fossa causes bowel obstruction. Why is it dangerous?**
   ? Because **inferior mesenteric vein** lies in its fold and may be damaged during surgery.

9. **A patient has persistent bleeding from Meckel's diverticulum.**
   ? Due to ectopic **gastric mucosa** secreting acid ? ulceration and bleeding.

10. **Post-surgical adhesions between omentum and intestines cause intestinal obstruction.**
    ? Due to **fibrous bands** following peritoneal inflammation.

11. **Fluid seen on ultrasound in the hepatorenal space in supine position.**
    ? Indicates **peritonitis, ascites, or ruptured viscera** — fluid gravitates to Morrison's pouch.

12. **Ectopic pregnancy ruptures in fallopian tube — where does blood collect first?**
    ? In the **pouch of Douglas** (lowest peritoneal space in female).

13. **Chronic pelvic pain and infertility in a woman.**
    ? May result from **peritoneal adhesions** or **obliteration of pouch of Douglas** in **endometriosis**.

14. **Fluid detected under diaphragm on erect X-ray.**
    ? Suggests **pneumoperitoneum** due to perforated hollow viscus (e.g., gastric or duodenal ulcer).

15. **A patient develops severe right-sided abdominal pain after peritoneal dialysis.**
    ? May be due to **peritoneal irritation or infection** (peritonitis).

16. **Rupture of pancreas leads to fluid behind stomach.**
    ? Accumulation occurs in **lesser sac**, forming **pancreatic pseudocyst**.

17. **Chronic constipation with mobile colon.**
    ? Due to **failure of fixation** of descending colon to posterior abdominal wall.

18. **Localized peritonitis remains confined around appendix. Why?**
    ? **Greater omentum** migrates and walls off infection ? *“policeman of abdomen”*.

19. **During surgery for hernia, surgeon notes intestine trapped beneath mesentery of duodenum.**
    ? Indicates **paraduodenal internal hernia**.

20. **An elderly patient with ascites shows fluid shifting from upper abdomen to pelvis upon posture change.**
    ? Due to communication between **supracolic and infracolic compartments** via **paracolic gutters**.

? Frequently Asked Questions — Peritoneum and Development of Gut

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1. What is the peritoneum?

It is a **serous membrane** lining the abdominal and pelvic cavities and covering the viscera. It consists of:

- **Parietal peritoneum** (lining wall)
- **Visceral peritoneum** (covering organs)

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2. What are the two sacs of the peritoneal cavity?

1. **Greater sac** — the main and larger part of the cavity.
2. **Lesser sac (Omental bursa)** — a smaller space behind the stomach and lesser omentum.

They communicate through the **epiploic foramen (Foramen of Winslow).**

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3. What are the main peritoneal folds?

- **Omenta** (greater and lesser)
- **Mesenteries** (mesentery of small intestine, transverse and sigmoid mesocolon)
- **Ligaments** (falciform, gastrosplenic, splenorenal, etc.)

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4. What is the function of the peritoneum?

- **Lubrication** for visceral movement.
- **Support** of organs through ligaments and mesenteries.
- **Defense** (contains macrophages, lymphatics).
- **Absorption** and **fat storage**.

- **Infection localization** via greater omentum.

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5. What is the greater omentum?

A large **four-layered peritoneal fold** descending from the **greater curvature of the stomach** and **first part of duodenum**, then folding back to attach to the **transverse colon**.

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6. Why is the greater omentum called the “Policeman of the abdomen”?

Because it **migrates** toward inflamed or infected areas (e.g. appendix, perforated ulcer) and **walls them off**, preventing spread of infection.

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7. What is the lesser omentum and what are its contents?

A **two-layered fold** connecting **lesser curvature of stomach and first part of duodenum** to the **liver**.
It contains the **portal triad**:

- Bile duct (right)
- Hepatic artery (left)
- Portal vein (behind)

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8. What is the epiploic foramen (Foramen of Winslow)?

A natural opening between the **greater and lesser sacs**.
Boundaries:

- Anterior: Portal triad (in hepatoduodenal ligament)
- Posterior: IVC

- Superior: Caudate process of liver
- Inferior: First part of duodenum

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9. What is the Pringle's maneuver?

A surgical maneuver to control **hepatic bleeding** by **compressing the hepatoduodenal ligament**, which temporarily occludes the hepatic artery and portal vein.

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10. What are the compartments of the peritoneal cavity?

- **Supracolic compartment:** Above transverse mesocolon (liver, stomach, spleen)
- **Infracolic compartment:** Below it (small intestine, ascending and descending colon)
- **Pelvic cavity:** Continuation below

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11. What is Morrison's pouch?

Also called the **hepatorenal pouch**, it lies between the **right kidney** and the **posterior surface of liver**.
It is the **lowest part** of the supracolic compartment when supine.

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12. What is the lowest part of the peritoneal cavity in females?

The **rectouterine pouch (Pouch of Douglas)** — between uterus and rectum.

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13. What is the lowest part of the peritoneal cavity in males?

The **rectovesical pouch**, between urinary bladder and rectum.

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14. What is a subphrenic abscess and why does it cause shoulder pain?

Pus beneath the diaphragm ? irritates **phrenic nerve (C3–C5)** ? referred pain to **shoulder tip** (same dermatome as supraclavicular nerve).

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15. What is a paraduodenal recess and its significance?

A peritoneal pocket near the **duodenojejunal flexure** containing the **inferior mesenteric vein**. It is a **common site for internal hernia**, which can cause intestinal obstruction.

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16. What are the paracolic gutters and their significance?

Grooves on either side of the colon that allow **flow of peritoneal fluid**:

- **Right gutter:** Communicates freely between pelvis and Morrison's pouch.
- **Left gutter:** Limited by phrenicocolic ligament (near spleen).

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17. What is a Meckel's diverticulum?

A **true diverticulum** of the ileum, representing a remnant of the **vitelline duct**.
Located about **2 feet from ileocecal junction**, **2 inches long**, may cause bleeding or obstruction.

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18. What is the clinical importance of the lesser sac?

- Site of **abscess** after posterior gastric ulcer or pancreatitis.
- May contain **pancreatic pseudocyst**.
- Internal hernia can occur through **epiploic foramen** into this sac.

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19. What is peritoneal dialysis?

A medical procedure where the **peritoneum acts as a semipermeable membrane** to exchange waste, electrolytes, and fluid — used in **renal failure**.

20. What are ascites and peritonitis?

- **Ascites:** Accumulation of fluid in peritoneal cavity (e.g. cirrhosis, portal hypertension).
- **Peritonitis:** Inflammation of peritoneum due to infection or perforation; presents with **rigid abdomen and severe pain**.

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21. What is the embryological origin of peritoneal folds?

Derived from **dorsal and ventral mesenteries** of the primitive gut.

- **Ventral mesentery:** Forms lesser omentum and falciform ligament.
- **Dorsal mesentery:** Forms greater omentum, mesentery, and other ligaments.

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22. How does the midgut rotate during development?

The **midgut loop rotates 270° anticlockwise** around the **superior mesenteric artery**, placing:

- Jejunum and ileum centrally,
- Cecum in right iliac fossa,
- Colon ascending and descending secondarily retroperitoneal.

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23. What is meant by “retroperitoneal organ”?

An organ covered by **peritoneum only on its anterior surface**, e.g. kidneys, pancreas, duodenum (except 1st part), ascending and descending colon.

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24. Why are peritoneal recesses important clinically?

They serve as **sites for internal hernia or localized infection**, especially **paraduodenal** and **ileocecal** fossae.

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25. Which spaces are most dependent for fluid collection?

- **Supine position:** Morrison's pouch.
- **Erect position:** Pelvic pouches (rectovesical in males, rectouterine in females).

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26. What is the difference between mesentery and omentum?

- **Mesentery:** Double layer of peritoneum connecting intestine to posterior wall.
- **Omentum:** Double layer connecting stomach to another organ.

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27. Which peritoneal folds transmit vessels to liver and stomach?

- **Lesser omentum** — contains hepatic artery, bile duct, portal vein.
- **Gastrosplenic ligament** — transmits short gastric and left gastroepiploic arteries.

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28. What are the consequences of peritoneal adhesions?

Fibrous adhesions following inflammation or surgery can **restrict gut movement** and cause **intestinal obstruction**.

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29. What is pneumoperitoneum and how is it detected?

Free gas in peritoneal cavity due to **perforated hollow organ** — seen as **air under diaphragm** on erect X-ray.

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30. Why is the greater omentum often thick and fatty in adults?

Because it serves as a **fat storage organ** and **insulator**, containing variable adipose tissue.

? Multiple Choice Questions – Peritoneum and Development of Gut

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1. The peritoneum is derived from which embryonic layer?

a. Ectoderm

b. Mesoderm

c. Endoderm

d. Mesenchyme

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2. The peritoneal cavity in males is:

a. Open to exterior through genital tract

b. A closed cavity

c. Communicates with urinary bladder

d. Absent below diaphragm

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3. The peritoneal cavity in females communicates with exterior through:

a. Rectum

b. Uterus only

c. Uterine tubes

d. Urethra

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4. The lesser sac (omental bursa) lies:

a. Anterior to stomach

b. Posterior to stomach and lesser omentum

c. Between transverse colon and jejunum

d. Below sigmoid mesocolon

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5. The greater omentum connects:

a. Lesser curvature of stomach to liver

b. Greater curvature of stomach to transverse colon

c. Stomach to posterior abdominal wall

d. Duodenum to pancreas

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6. The epiploic foramen communicates between:

a. Right and left paracolic gutters

b. Infracolic and supracolic compartments

c. Greater sac and lesser sac

d. Subphrenic and subhepatic spaces

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7. The anterior wall of the epiploic foramen is formed by:

a. Inferior vena cava

b. Hepatoduodenal ligament containing the portal triad

c. First part of duodenum

d. Caudate lobe of liver

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8. The lowest part of the peritoneal cavity in the erect female is:

a. Subhepatic space

b. Rectovesical pouch

c. Rectouterine pouch (Pouch of Douglas)

d. Right paracolic gutter

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9. The lowest part of the peritoneal cavity in the erect male is:

a. Subphrenic space

b. Rectovesical pouch

c. Infracolic compartment

d. Morrison’s pouch

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10. The hepatorenal pouch (Morrison’s pouch) lies between:

a. Liver and diaphragm

b. Liver and right kidney

c. Stomach and pancreas

d. Duodenum and transverse colon

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11. Which structure divides the peritoneal cavity into supracolic and infracolic compartments?

a. Greater omentum

b. Mesentery

c. Transverse mesocolon

d. Falciform ligament

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12. Which of the following spaces is the lowest in the supine position?

a. Rectouterine pouch

b. Rectovesical pouch

c. Hepatorenal pouch (Morrison’s pouch)

d. Subphrenic space

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13. The greater omentum contains which vessels?

a. Left gastric artery

b. Right and left gastroepiploic arteries

c. Middle colic artery

d. Splenic artery

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14. The Pringle’s maneuver is used to control bleeding from:

a. Stomach

b. Duodenum

c. Liver

d. Pancreas

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15. The mesentery of small intestine transmits branches of:

a. Celiac trunk

b. Superior mesenteric artery and vein

c. Inferior mesenteric artery

d. Internal iliac artery

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16. The peritoneal fold that attaches liver to anterior abdominal wall is:

a. Falciform ligament

b. Lesser omentum

c. Coronary ligament

d. Hepatoduodenal ligament

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17. The left paracolic gutter is limited superiorly by:

a. Hepatorenal ligament

b. Lesser omentum

c. Phrenicocolic ligament

d. Gastrosplenic ligament

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18. The pouch of Douglas (rectouterine pouch) is bounded anteriorly by:

a. Rectum

b. Posterior wall of uterus and vagina

c. Bladder

d. Sacrum

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19. The most common site of internal hernia in abdomen is:

a. Retroduodenal recess

b. Intersigmoid fossa

c. Paraduodenal recess

d. Inferior ileocecal recess

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20. Meckel's diverticulum develops from persistence of:

a. Allantoic duct

b. Cloacal membrane

c. Vitelline (omphalomesenteric) duct

d. Median umbilical ligament

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21. The midgut rotates during development around which vessel?

a. Celiac trunk

b. Superior mesenteric artery

c. Inferior mesenteric artery

d. Portal vein

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22. The total degree of midgut rotation during development is:

a. 90° clockwise

b. 180° clockwise

c. 270° anticlockwise

d. 360° clockwise

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23. The peritoneal fold enclosing the appendix and its vessels is the:

a. Mesentery

b. Mesoappendix

c. Sigmoid mesocolon

d. Hepatoduodenal ligament

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24. The organ which is secondarily retroperitoneal is:

a. Stomach

b. Ascending colon

c. Jejunum

d. Appendix

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25. The “policeman of the abdomen” refers to:

a. Liver

b. Mesentery

c. Greater omentum

d. Falciform ligament

? **Answer Key Summary**

Q	ANSWER	Q	ANSWER	Q	ANSWER	Q	ANSWER	Q	ANSWER
1	b	6	c	11	c	16	a	21	b
2	b	7	b	12	c	17	c	22	c
3	c	8	c	13	b	18	b	23	b
4	b	9	b	14	c	19	c	24	b
5	b	10	b	15	b	20	c		

? Viva Voce — Peritoneum and Development of Gut

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1. What is the peritoneum?

It is a **serous membrane** that lines the abdominal and pelvic cavities and covers most of the viscera, forming **parietal** and **visceral** layers.

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2. What is the peritoneal cavity?

A **potential space** between parietal and visceral layers containing **serous fluid**, which allows **free movement of abdominal organs**.

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3. How is the peritoneal cavity different in males and females?

- In **males**, it is a **closed sac**.
- In **females**, it **communicates with exterior** through **uterine tubes, uterus, and vagina**.

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4. Name the two main divisions of the peritoneal cavity.

- **Greater sac**
- **Lesser sac (Omental bursa)**

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5. How do the greater and lesser sacs communicate?

Through the **epiploic foramen (Foramen of Winslow)**.

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6. What are the boundaries of the epiploic foramen?

- **Anterior:** Hepatoduodenal ligament (portal triad)
- **Posterior:** Inferior vena cava
- **Superior:** Caudate lobe of liver
- **Inferior:** First part of duodenum

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7. What is the significance of the epiploic foramen in surgery?

It allows access to the **portal triad** — during **Pringle's maneuver**, the hepatoduodenal ligament is clamped to control hepatic bleeding.

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8. What are the contents of the lesser omentum?

- **Bile duct** (right)
- **Hepatic artery proper** (left)
- **Portal vein** (posteriorly)

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9. Why is the greater omentum called the "Policeman of the abdomen"?

Because it **migrates** to inflamed organs and **walls off infection**, preventing peritonitis from spreading.

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10. Which structure divides the peritoneal cavity into supracolic and infracolic compartments?

The **transverse mesocolon**.

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11. What are the contents of the supracolic compartment?

Stomach, liver, and spleen.

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12. What are the contents of the infracolic compartment?

Small intestine, ascending and descending colon.

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13. What is Morrison’s pouch?

Also called the **hepatorenal recess** — a space between **right kidney** and **posterior surface of liver**; it is the **lowest part** of the supracolic compartment in supine posture.

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14. What is the lowest part of the peritoneal cavity in the erect female?

The **rectouterine pouch (Pouch of Douglas).**

---

15. What is the lowest part of the peritoneal cavity in the erect male?

The **rectovesical pouch.**

---

16. What are the paracolic gutters and their importance?

They are **grooves on the lateral sides of ascending and descending colon**.

- **Right paracolic gutter**: Route for infection spread between pelvis and subhepatic space.
- **Left paracolic gutter**: Limited by **phrenicocolic ligament**, restricting spread.

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17. What are peritoneal recesses (fossae)?

Small **pockets formed by peritoneal folds**, e.g. duodenal, paraduodenal, and ileocecal recesses — potential sites for **internal hernia**.

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18. Which is the most common site for internal hernia?

The **paraduodenal recess** (left of duodenojejunal flexure).

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19. Where does the appendix usually lie in the peritoneal cavity?

Commonly in the **retrocecal recess** behind the cecum.

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20. What is the mesentery and what does it contain?

A **fan-shaped peritoneal fold** connecting small intestine to posterior wall; contains **superior mesenteric vessels, lymphatics, and nerves**.

---

21. What is the difference between mesentery and omentum?

- **Mesentery:** Connects intestine to posterior abdominal wall.
- **Omentum:** Connects stomach to other viscera.

---

22. What is the embryological origin of peritoneal folds?

They arise from **ventral and dorsal mesenteries** of the embryonic gut.

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23. What is the degree of rotation of the midgut during development?

270° anticlockwise around the **superior mesenteric artery**.

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24. What happens if the midgut rotation is abnormal?

It may lead to **malrotation**, **volvulus**, or **internal hernia**.

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25. What is Meckel's diverticulum?

A **remnant of the vitelline duct**, located on antimesenteric border of ileum about **2 feet from ileocecal junction** — may ulcerate, bleed, or mimic appendicitis.

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26. What are secondarily retroperitoneal organs?

Organs that were initially intraperitoneal but became fixed to posterior wall after fusion of mesentery — **duodenum (except 1st part), pancreas, ascending and descending colon.**

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27. What is peritoneal dialysis and why is it possible?

A therapeutic process where **peritoneum acts as a semipermeable membrane** for exchange of solutes and fluid — used in **renal failure**.

---

28. What is ascites?

Abnormal accumulation of **fluid in peritoneal cavity**, commonly due to **portal hypertension, cirrhosis, or hypoproteinemia**.

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29. What is peritonitis?

Inflammation of peritoneum caused by bacterial contamination or perforation of hollow viscera.

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30. Why does peritonitis cause rigidity of the abdomen?

Because the **inflamed parietal peritoneum** causes **reflex contraction of abdominal muscles**.

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31. Why does subphrenic abscess cause shoulder pain?

Because it irritates the **phrenic nerve (C3–C5)**, leading to **referred pain to the shoulder tip** via the **supraclavicular nerve**.

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32. What is a Pringle's maneuver?

Surgical **compression of hepatoduodenal ligament** across epiploic foramen to temporarily occlude **portal vein and hepatic artery** during hepatic bleeding.

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33. What is the function of the peritoneal fluid?

It provides **lubrication**, allows **smooth visceral movements**, and contains **immune cells** for defense.

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34. What happens when posterior gastric ulcer perforates?

The **gastric contents enter the lesser sac**, causing **localized peritonitis or abscess**.

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35. What is the clinical significance of the pouch of Douglas?

It is the **lowest part of peritoneal cavity in erect female**, where fluid, pus, or blood collects — accessed by **culdocentesis** through posterior vaginal fornix.

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36. Why is the greater omentum often fatty in adults?

Because it acts as a **fat storage organ** and provides **thermal insulation** for abdominal viscera.

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37. What is the role of the peritoneum in infection control?

It localizes infection via **adhesion formation**, **absorption of toxins**, and **increased lymphatic drainage**.

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38. What is the difference between intraperitoneal and retroperitoneal organs?

- **Intraperitoneal:** Completely covered by peritoneum (stomach, jejunum, spleen).
- **Retroperitoneal:** Covered only anteriorly (kidneys, pancreas, duodenum, ascending and descending colon).

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39. What is pneumoperitoneum and what does it indicate?

Presence of **free gas under diaphragm** — indicates **perforation of a hollow viscus** (e.g. gastric ulcer, intestinal perforation).

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40. What is a subhepatic abscess and where does it lie?

An abscess below the liver, often within **Morrison's pouch** — may follow **appendicitis, cholecystitis, or perforated duodenal ulcer**.