LEARNING OBJECTIVES

1. List the parts and anatomical regions of the small and large intestines
2. State anatomical relations of the small and large intestines
3. Mention the arterial supply, venous and lymphatic drainage and innervation of the small and large intestines
4. Discuss the importance of the mesenteries that are related to the small and large intestines
5. Relate the significance of McBurney’s point to the anatomical position of the vermiform appendix in clinical practice
6. Describe the clinical relevance of the ligament of Treitz
7. Explain the following clinical terms: ischemia of intestines, appendicitis, hemorrhoids, rectal examination
Small intestine

• Divided into
  ➢ duodenum
  ➢ jejunum
  ➢ ileum
DUODENUM

• C-shaped
• Extent: pyloric sphincter - duodenojejunal flexure
• Mostly Retroperitoneal except near stomach
• Characterized by Brunner’s glands in submucosa
• These tubular glands secrete mucus
• Primary function - food digestion & absorption
DUODENUM

• Four anatomical parts of the duodenum

• Superior (first) part
  - Related to the pylorus
  - Intraperitoneal - found in the hepatoduodenal lig - freely mobile
  - Posteriorly - bile duct, gastroduodenal art, portal vein
• Descending (second) part
  - Retroperitoneal
  - Bile duct and main pancreatic duct join to form hepatopancreatic ampulla
  - Major duodenal papilla (of Vater) located posteromedial
  - Also related to the Fundus & body of gallbladder, right kidney, transverse colon, head of pancreas
DUODENUM CONTD...

• Horizontal (third) part
  - Retroperitoneal
  - Related to the:
    - Psoas major muscle
    - IVC & aorta
    - Right ureter
    - Gonadal vessels
    - Superior mesenteric art & vein
DUODENUM CONT'D...

• Ascending (fourth) part
  - Retroperitoneal
  - Duodenojejunal flexure supported by suspensory ligament of duodenum (of Treitz)
    - Lig of Treitz used to locate duodenojejunal flexure
    - Clinical dividing line between upper and lower gastrointestinal tracts
    - Most gastrointestinal hemorrhage is above the ligament of Treitz, coming from esophagus, stomach or duodenum
  - Douodenal ulcers may cause peritonitis
BLOOD & NERVE SUPPLY TO THE DUODENUM

• Arterial Supply
  ➢ Supraduodenal art - can be used to identify the first part of the duodenum
  ➢ sup & inf pancreaticoduodenal arts with their ant & post branches that form arcades
  ➢ Right gastric art
  ➢ Gastroduodenal art

• Venous Drainage
  ➢ Duodenal veins draining into the portal vein
BLOOD & NERVE SUPPLY TO THE DUODENUM

• Lymphatic Drainage
  - Ant lymphatic vessels drain into pancreaticoduodenal nodes, pyloric lymph nodes
  - Post lymphatic vessels drain into sup mesenteric lymph nodes
  - Celiac lymph nodes

• Innervation
  - Vagus nerve
  - Celiac & sup mesenteric plexuses
JEJUNUM

- **Extent**: duodenum - ileum
- Intraperitoneal
- Most of it lies in Left upper quadrant
- Lumen slightly larger than ileum
- More internal folds than ileum - plicae circulare & villi
- Deeper red with greater vascularity
ILEUM

- Terminal portion
- Most of it lies in Right lower quadrant
- Ends at ileocecal junction
- Joins cecum medially through ileocecal valve
- Have shorter straight arteries than jejunum
- Has abundant lymph nodules - Peyer’s patches or Mesenteric patches - GALT
MESENTERY ASSOCIATED WITH JEJUNUM & ILEUM

• Jejunum & ileum attached to posterior abdominal wall by mesentery

• Extent of the root (origin) of mesentery
  ➢ duodenojejunal junction - ileocolic junction

• The root of mesentery crosses
  ➢ Ascending & horizontal duodenum
  ➢ Abdominal aorta & IVC
  ➢ Right ureter, Right psoas major
  ➢ Right testicular or ovarian vessels
BLOOD & NERVE SUPPLY TO THE JEJUNUM & ILEUM

- Arterial supply
  - Sup mesenteric art - arterial arcades that give rise to vasa recta - ischemia of intestines
BLOOD & NERVE SUPPLY TO THE
JEJUNUM & ILEUM

• Venous Drainage
  - Sup mesenteric vein

• Lymphatic Drainage
  - Lacteals, sup mesenteric lymph nodes, ileocolic lymph nodes

• Innervation
  - Parasympathetic - Vagus nerve
  - Sympathetic - Lesser splanchnic nerve
  - Superior mesenteric plexus
LARGE INTESTINE OR COLON

- **Extent**: Ileocecal junction - anus
- **Length**: About 1.5 m
- **Parts**:
  - Cecum with attached vermiform appendix
  - Colon: ascending, transverse, descending, sigmoid
  - Rectum and anal canal
SPECIAL FEATURES

- **Teniae coli** - three thickened bands of longitudinal muscle
- **Haustra** - sacculations of its wall
- **Omental (epiploic) appendages** - small pouches of omentum (peritoneum) filled with fat
- **Villi** - Mucosa has no villi but numerous mucus cells
Appendices epiploicae (Omental tags)

Tenia coli

Haustra
CECUM

- Blind sac invested in peritoneum
- 8 cm W x 8 cm L, located in RIF
- Vermiform appendix attached to posteromedial wall & taenia coli converge on appendix
CECUM CONTD...

- Lat & med - attached by peritoneal cecal folds to iliac fossa
- This produces a small sac of peritoneal cavity called retrocecal recess
- Retrocecal recess lies post to cecum
- It may extend sup, post to inferior end of ascending colon as retrocolic recess
- In 64% of people - appendix lies in retrocolic recess
RELATIONS OF THE CECUM

• Post - lies on iliacus & psoas
• Ant - small intestines & ant abdominal wall
VERMIFORM APPENDIX

- About 8 cm long & worm-shaped
- Joins cecum about 2.5 cm inf to ileocecal junction
- Longer in children than in adults
- Very mobile & its position is variable
VERMIFORM APPENDIX CONTD...

• Has a mesentery called mesoappendix which joins it to terminal ileum
• Appendicular artery (an end artery) is within this fold
• Usually retrocecal - post to cecum
• The 3 teniae coli of cecum converge at base of appendix
VERMIFORM APPENDIX CONTD...

• Its base usually lies deep at Mc Burney’s point - junction of lat & mid thirds of line joining ant sup iliac spine & umbilicus

• In appendectomy, incisions are made about 2.5 cm superomedial to ant. sup. iliac spine

• Appendicitis - inflammation of appendix

• Rupture of inflamed appendix causes general peritonitis - increased abdominal pain
ASCENDING COLON

- About 15 cm long
- Ascends on right side of abdominal cavity
- From cecum to right lobe of liver
- It turns to the left as right colic (hepatic) flexure
- It usually has no mesentery - 25% of people have a short mesentery
- Lies retroperitoneally along right side of posterior abdominal wall
ASCENDING COLON - CONTD...

- **Posterior relations**
  - Back muscles: iliacus & quadratus lumborum; right kidney
  - Nerves of posterior abdominal wall: ilioinguinal & iliohypogastric

- **Anterior relations** - small intestines & greater omentum

- **Laterally** - covered by peritonium, which attaches it to posterior abdominal wall

- Its peritonium forms a trench or groove called **right paracolic gutter**
The diagram illustrates the anatomical structures of the abdominal cavity, highlighting the lesser curvature of the stomach, the greater curvature of the stomach, the diaphragm, lobes of the liver, gallbladder, spleen, ascending colon, greater omentum, transverse colon, descending colon, cecum, sigmoid colon, and small intestine. The image also demonstrates the size and relations of these organs within the abdominal cavity.
ASCENDING COLON - CONTD...

- **VOLVULUS**
  - Abnormal mobility of cecum & proximal part of ascending colon because inferior part of ascending colon has a mesentery
  - It may cause obstruction of intestines resulting from twisting

- **CECOPEXY** - Anchoring procedure where tenia colia of cecum & ascending colon are sutured to abdominal wall to avoid volvulus
TRANSVERSE COLON

- **Length**: About 50 cm
- **Extent**: Right colic to left colic flexures
- **Largest & most mobile part of L intestine**
- **Splenic flexure**:
  - lies ant. to the inferior part of left kidney & is attached to the diaphragm by **phrenicocolic ligament** - shelf to support spleen
  - is more sup. & post. to right colic flexure &
  - more acute & less mobile than hepatic flexure
- It has a mesentery called **transverse mesocolon**
- Mesocolon suspends transverse colon from posterior abdominal wall
- T. colon is variable in position
DESCENDING COLON

- **Length**: About 30 cm
- **Extent**: Left colic (splenic) flexure into left iliac fossa where it is continuous with sigmoid colon
- **Caliber**: smaller than ascending colon
- **Relations**:
  - Sup - related to diaphragm & quadratus lumborum muscles
  - Passes ant. to lat. border of left kidney, transversus abdominis & quadratus lumborum muscles
DESCENDING COLON CONTD...

- It usually has no mesentery (33% of pple have)
- Has left paracolic gutter on lat aspect
SIGMOID COLON

• Length: About 40 cm
• Extent: Btwn descending colon & rectum
• Forms S-shaped loop - Greek letter sigma (S)
• It is also called pelvic colon
• Termination of teniae coli indicates beginning of rectum
• Has a long mesentery - sigmoid mesocolon whose root has an inverted V - shaped attachment sup
Figure 3.38 Peritoneum (green) in the female pelvis. The...
SIGMOID COLON CONT'D...

- Left ureter & a division of left common iliac artery are post to the apex of the mesentery
- It occupies **rectovesicle pouch** in males & **rectouterine pouch** in females
- Has long omental appendages
- Rectosigmoid junction is about 15 cm from anus
- Post - Left external iliac vessels & piriformis muscle
SIGMOID COLON CONT'D...
• 12 cm long
• Sup - continuous with sigmoid colon at the level of S3 - rectosigmoid junction
• Inf - continuous with anal canal
PERITONEAL RELATIONS

- Sup 1/3 ant & lat peritoneal cover
- Mid 1/3 ant peritoneal cover
- Inf 1/3 no peritoneal cover
- **Rectal examination** - prostate gland
ANAL CANAL

- Terminal part of GI tract - 4 cm long
- **Anus** - external opening of anal canal
- Two sphincters guard the anus
- **External anal sphincter** - composed of skeletal muscle
- **Internal anal sphincter** - composed of smooth muscle fibers
- Has **anal columns & anal valves** with anastomoses; **anal sinuses**
- **Hemorrhoids** - veins in anal area
BLOOD & NERVE SUPPLY TO THE LARGE INTESTINE

• Arterial supply

• Branches of SMA
  - Middle colic art with its branches - R & L
  - Right colic with its branches - ascending & descending
  - Ileocolic with its branches - colic and ileal

• Branches of IMA
  - Left colic art
  - Sigmoid art
BLOOD & NERVE SUPPLY TO THE LARGE INTESTINE

• Venous Drainage
  ➢ Superior mesenteric vein
  ➢ Inferior mesenteric vein
  ➢ Splenic vein
  ➢ Portal vein

• Lymphatic Drainage
  ➢ Follow arteries
  ➢ Preaortic lymph nodes
BLOOD & NERVE SUPPLY TO THE LARGE INTESTINE

• Innervation

• Parasympathetic
  ➢ Vagus nerve
  ➢ Pelvic splanchnic nerves

• Sympathetic
  ➢ Superior mesenteric & aorticorenal ganglia
  ➢ Lesser splanchnic nerves
  ➢ Inferior mesenteric ganglia
  ➢ Lumbar splanchnic nerves