

Abdomen

Organs Supplied by Superior & Inferior Mesenteric Arteries

Small Intestine

- 1) 18 to 21 feet long between pyloric sphincter and ileocecal junction
- 2) plicae circularis - permanent folds on the interior of the lumen (increase surface area)
- 3) three parts - duodenum, jejunum, and ileum
- 4) duodenum
 - a) about 10 inches long; mostly retroperitoneal
 - b) C-shape that surrounds the head of the pancreas
 - c) 4 parts
 - i) superior (1st) part – intraperitoneal, continuous with pylorus
 - ii) descending (2nd) part – receives bile and pancreatic secretions via ampulla of Vater
 - iii) horizontal (3rd) part
 - iv) ascending (4th) part - continuous on the left side of the posterior abdominal wall with the jejunum at duodenojejunal junction (level of L2)
- 5) jejunum and ileum
 - a) intraperitoneal
 - b) mesentery of the small intestine
 - i) fan-shaped
 - ii) root (origin) of the mesentery (6 – 8 inches long) is attached to the posterior abdominal wall; runs obliquely from duodenojejunal junction in the LUQ to the ileocecal junction in the RLQ
 - iii) function – imparts mobility and flexibility to the small intestine and is a conduit for its neurovascular supply
 - c) jejunum – located upper abdominal cavity
 - d) ileum - located lower abdominal cavity and “hangs down” into the pelvic cavity
 - e) ileum - continuous with the cecum at the ileocecal junction (RLQ); while controversial, current opinion is that there is no functional ileocecal valve
- 6) function
 - a) digestion - secretes enzymes that work on small molecules
 - b) absorption of substances from chyme

Colon

- 1) 5 parts – cecum, ascending, transverse, descending, and sigmoid colons
- 2) cecum
 - a) blind pouch inferior to ileocecal junction in the right iliac fossa of the RLQ
 - b) intraperitoneal
 - c) vermiform (L. vermis, worm-like) appendix
 - i) a finger-like process whose lumen is continuous with that of the cecum
 - ii) position is variable but usually attached to the posteromedial wall of the cecum
- 3) ascending colon
 - a) ascends vertically on right side from ileocecal junction
 - b) continuous with the transverse colon at the right colic (hepatic) flexure immediately inferior to the right lobe of the liver
 - c) secondarily retroperitoneal

- d) right medial and lateral paracolic gutters – “troughs” of the peritoneal cavity on either side of the organ
- 4) transverse colon
 - a) intraperitoneal
 - b) transverse mesocolon – root lies along the pancreas
 - c) attached to greater omentum of the stomach
- 5) descending colon
 - a) continuous with the transverse colon at the left colic (splenic) flexure adjacent to the spleen
 - b) descends vertically on left side
 - c) secondarily retroperitoneal
 - d) left medial and lateral paracolic gutters
- 6) sigmoid colon
 - a) continuous with the descending colon in the left iliac fossa of the LLQ
 - b) S-shaped – highly variable in length and may be quite long
 - c) descends into the pelvic cavity
 - d) sigmoid mesocolon – attached to posterior abdominal and pelvic walls
- 7) unique features of the colon
 - a) teniae coli – external muscular coat arranged into three evenly spaced longitudinal bands
 - b) appendices epiploicae (omental appendices) – finger-like fat pads
 - c) haustra – series of sacculations
 - d) plicae semilunaris – permanent folds on the interior of the lumen (increase surface area)
- 8) function
 - a) absorption of water and electrolytes from chyme (results in concentration of chyme to create feces) – occurs mostly in proximal (right) half of the colon
 - b) storage of feces until it can be expelled – occurs mostly in distal (left) half of the colon

Clinical Notes: 1) Diverticulum – a sac-like herniation of the wall of a hollow organ or structure. In the GI tract a “true” diverticulum contains all layers of the wall of the organ whereas a “false” or “pseudo” diverticulum is limited to herniation of the mucosal and submucosal layers through a defect in the muscular layers. Diverticula occur more frequently in the colon than any other segment of the GI tract. True diverticula are rare. In contrast pseudodiverticula are very common (e.g. present in about one-third of individuals over the age of 50) and are usually small and multiple. In common clinical practice the term diverticulosis refers to the presence of pseudodiverticula in the colon, which are more common in the distal half of the colon than the proximal half, e.g. 95% of cases involve at a minimum the sigmoid colon while only 5% of cases involve the cecum. 2) Diverticulitis – acute infection and inflammation of a diverticulum; often preceded by entrapment of a fecalith (a concretion [hard mass] of fecal matter) in the lumen of the diverticulum. 3) Meckel's diverticulum – a diverticulum of the ileum that is present in up to 2% of the population and is the most common cause of GI bleeding in children. A congenital anomaly in which there is an incomplete obliteration of the vitelline duct (yolk stalk), leaving an ileal diverticulum. Half of Meckel's diverticula are lined with gastric, not ileal, mucosa whose acid secretion induces an ulceration of the neighboring ileal mucosa that leads to bleeding; treatment via surgical resection. 4) Volvulus – intestinal obstruction due to rotation of bowel around its mesentery or mesocolon; most common (65% of cases) in the sigmoid colon. Symptoms are nonspecific and include constipation, abdominal distention, and abdominal pain. Sigmoid volvulus may occur as a complication of pregnancy in the third trimester due to the effects of the enlarging uterus.

Superior Mesenteric Artery (SMA)

- 1) 2nd single midline branch of the abdominal aorta
- 2) originates a short distance below the celiac trunk opposite the L1 vertebra
- 3) enters the mesentery of the small intestine

- 4) shaped like an “archer’s bow” - concave and convex sides; convex faces to the left, concave to the right
- 5) branches
 - a) inferior pancreaticoduodenal artery – ascends to supply duodenum and pancreas
 - b) intestinal branches – 12 to 20 branches to jejunum and ileum; arise from the convex (left) side of the SMA
 - i) intestinal branches form a series of anastomosing arcades
 - ii) straight arteries (vasa recta) – arise from the arcades and pierce the intestinal wall
 - c) colic branches – arise from the concave (right) side of the SMA
 - i) middle colic – to transverse colon
 - ii) right colic – to ascending colon
 - iii) ileocolic – to ileum, cecum, appendix, and proximal end of ascending colon; ileal branch anastomoses with the distal end of the SMA
 - (1) right colic artery often a branch of the ileocolic artery
 - iv) marginal artery – a continuous arterial channel formed by anastomoses between colic branches of superior and inferior mesenteric arteries; parallels the inner margin of the colon
- 6) superior mesenteric vein – unites with splenic vein behind the neck of the pancreas to form portal vein

Inferior Mesenteric Artery (IMA)

- 1) 3rd single midline branch of the abdominal aorta
- 2) originates near L3 vertebra about 4 cm above the aortic bifurcation
- 3) runs retroperitoneally on left side of posterior abdominal wall until it enters the sigmoid mesocolon
- 4) branches
 - a) left colic artery – to descending colon
 - b) 2 to 4 sigmoid arteries
 - c) a and b contribute to the marginal artery
- 5) descends over the pelvic brim into the pelvis where it is renamed superior rectal artery
- 6) superior rectal vein forms a portal-systemic anastomosis with the middle rectal vein of the pelvis
- 7) inferior mesenteric vein – tributary of the splenic vein behind the body of the pancreas

Authored by:

Raymond J. Walsh, Ph.D.

Professor & Chair

Department of Anatomy & Cell Biology

The George Washington University

School of Medicine & Health Sciences

ISBN 0-9655384-9-4