Topography of the GIT

By Dr. Munirah Batarfi
Palate

Hard palate

Maxilla

Palatine

Soft palate

Vestibule

Incisive papilla overlying incisive fossa

Palatine rugae

Hard palate

Soft palate

Uvula
Blood supply and innervation
Dorsum of tongue
Blood supply

[Diagram showing blood supply to the tongue with labels for Facial a., Lingual a., Styloglossus, Hyoglossus, and Genioglossus.]
Lymphatic drainage
Salivary glands
Constrictor muscles
Arterial supply of the gut

Foregut: Celiac trunk
Midgut: Superior mesenteric Ar.
Hindgut: Inferior mesenteric Ar.
ESOPHAGUS

The esophagus is a muscular tube about 25 cm long which connects the pharynx with the stomach. The esophagus takes a straight course through the mediastinum of the thorax and pierces the diaphragm at the esophageal hiatus to enter the abdomen and the stomach. Associated with the esophagus, as it enters the abdominal cavity, are the anterior and posterior vagal trunks.

The arterial supply to the abdominal esophagus

Cervical part:
Inferior thyroid

Thoracic part:
Descending thoracic aorta.
Bronchial arteries

Abdominal part
left gastric artery (from the celiac trunk); and
from the left inferior phrenic artery (from the abdominal aorta).

Epithelial transition between the abdominal esophagus and stomach is associated with an increased risk of adenocarcinoma.
Hiatal Hernias

Paraesophageal hiatal hernia:

the cardia remains in its normal position, however, a pouch of peritoneum, often containing part of the fundus, extends through the esophageal hiatus anterior to the esophagus. In these cases, usually no regurgitation of gastric contents occurs because the cardiac orifice is in its normal position.

Sliding hiatal hernia:

the abdominal part of the esophagus, the cardia, and parts of the fundus of the stomach slide superiorly through the esophageal hiatus into the thorax, especially when the person lies down or bends over. Some regurgitation of stomach contents into the esophagus is possible because the clamping action of the right crus of the diaphragm on the inferior end of the esophagus is weak.
Stomach
Relations of the stomach

Anteriorly, the stomach is related to:

- the diaphragm, the left lobe of liver,
- and the anterior abdominal wall.

Posteriorly (Stomach bed):

- Transverse colon
- Transverse mesocolon
- Pancreas
- Spleen & splenic artery
- Left kidney
- Left suprarenal
- Left crus of the diaphragm
The arterial supply to the stomach includes:
the left gastric artery from the celiac trunk;
the right gastric artery from the hepatic artery proper;
the right gastro-omental artery from the gastroduodenal artery;
the left gastro-omental artery from the splenic artery; and
the posterior gastric artery from the splenic artery (variant and not always present).

Arterial supply to the abdominal esophagus and stomach.
Vagotomy (surgical section of the vagus nerves) is performed in some people with chronic or recurring ulcers to reduce the production of acid. Vagotomy may also be performed in conjunction with resection of the ulcerated area (antrectomy, or resection of the pyloric antrum) to reduce acid secretion.
Gastroesophageal Reflux Disease (GERD)

The terminal end of the esophagus possesses a lower esophageal sphincter (specialized smooth muscle); it prevents the reflux of gastric contents into the lower esophagus. However, it can become compromised, usually by a loss of muscle tone or a sliding hiatal hernia, leading to GERD and inflammation of the esophageal lining. GERD often presents with upper abdominal pain, dyspepsia, heartburn, and dysphagia.
Duodenum

It is retroperitoneal except for its beginning, which is connected to the liver by the hepatoduodenal ligament, a part of the lesser omentum.

Duodenum and biliary system

**TABLE 4-8 Features of the Duodenum**

<table>
<thead>
<tr>
<th>PART OF DUODENUM</th>
<th>DESCRIPTION</th>
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<tbody>
<tr>
<td>Superior</td>
<td>First part, attachment site for hepatoduodenal ligament of lesser omentum</td>
</tr>
<tr>
<td>Descending</td>
<td>Second part, site where bile and pancreatic ducts empty</td>
</tr>
<tr>
<td>Inferior</td>
<td>Third part, part that crosses inferior vena cava (IVC) and aorta and is crossed anteriorly by mesenteric vessels</td>
</tr>
<tr>
<td>Ascending</td>
<td>Fourth part, portion tethered by suspensory ligament at duodenojejunal flexure</td>
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Radiograph of the stomach and duodenum

Radiograph, using barium, showing the stomach and duodenum.
A. Double contrast radiograph of the stomach. B. Double contrast radiograph showing the duodenal cap.
Peptic Ulcer Disease

Peptic ulcers are GI lesions that extend through the muscularis mucosae and are remitting, relapsing lesions.

Erosions, on the other hand, affect only the superficial epithelium.

Acute lesions are small and shallow, whereas chronic ulcers may erode into the muscularis externa or perforate the serosa.

Although they may occur in the stomach, most occur in the first part of the duodenum, which is referred to by clinicians as the duodenal cap.
The jejunum represents the proximal two-fifths of SI. It is mostly in the left upper quadrant of the abdomen and is larger in diameter and has a thicker wall than the ileum. Additionally, the inner mucosal lining of the jejunum is characterized by numerous prominent folds that circle the lumen (plicae circulares). The less prominent arterial arcades and longer vasa recta (straight arteries) compared to those of the ileum are a unique characteristic of the jejunum.

**The arterial supply to the jejunum** includes jejunal arteries from the superior mesenteric artery.
The ileum makes up the distal three-fifths of the small intestine and is mostly in the right lower quadrant. Compared to the jejunum, the ileum has thinner walls, fewer and less prominent mucosal folds (plicae circulares), shorter vasa recta, more mesenteric fat, and more arterial arcades. It contains Peyer’s Patches.
The ileum (Cont’d)

The arterial supply to the ileum includes:
ileal arteries from the superior mesenteric artery; and an ileal branch from the ileocolic artery (from the superior mesenteric artery).
Radiograph, using barium, showing the jejunum and ileum.
This radiograph of the abdomen, anterior-posterior view, demonstrates a number of dilated loops of small bowel. Small bowel can be identified by the valvulae coniventes that pass from wall to wall as indicated. The large bowel is not dilated. The cause of the small bowel dilatation is an adhesion after pelvic surgery.
Crohn Disease

is an idiopathic inflammatory bowel disease that can affect any segment of the GI tract but usually involves the small intestine (terminal ileum) and colon. Transmural edema, follicular lymphocytic infiltrates, epithelioid cell granulomas, and fistulation characterize this disease. Signs and symptoms include the following:
● Diffuse abdominal pain (paraumbilical and lower-right quadrant)
● Diarrhea
● Fever
● Dyspareunia (pain during sexual intercourse)
● Urinary tract infection (UTI)
● Mal-absorption
LARGE INTESTINE
The large intestine frames the small intestines and extends from the ileocecal valve to the anus. Its diameter, is greater than that of the small intestine and it is 1.5m long.

Large intestine is formed of 4 regions:

a. Cecum (Appendix hangs from its posteromedial surface)
b. Colon
c. Rectum
d
Different positions of the appendix:-

- Retrocecal (the commonest).
- Sub cecal.
- Anteileal.
- Retroileal.
- Pelvic.

The surface projection of the base of the appendix is at the junction of the lateral and middle one third of a line from the anterior superior iliac spine to the umbilicus (McBurney’s point). People with appendicular problems may describe pain near this location.
Cecum and appendix (Cont’d)

The arterial supply to the cecum and appendix includes:
the anterior cecal artery from the ileocolic artery (from the superior mesenteric artery);
the posterior cecal artery from the ileocolic artery (from the superior mesenteric artery); and
the appendicular artery from the ileocolic artery (from the superior mesenteric artery).

Acute Appendicitis

Appendicitis is a fairly common inflammation of the appendix, often caused by bacterial infection. Initially, diffuse pain is felt in the periumbilical region. However, as the appendix becomes more inflamed and irritates the peritoneal peritoneum, the pain becomes well localized to the right lower quadrant (circumscribed tenderness to palpation). Surgical resection is the treatment of choice to prevent more serious life-threatening complications (abscesses and peritonitis).
Blood supply of the colon

The arterial supply to the ascending colon includes:
the colic branch from the ileocolic artery (from the superior mesenteric artery);
the anterior cecal artery from the ileocolic artery (from the superior mesenteric artery);
the posterior cecal artery from the ileocolic artery (from the superior mesenteric artery); and
the right colic artery from the superior mesenteric artery.
The arterial supply to the transverse colon includes:
the right colic artery from the superior mesenteric artery;
the middle colic artery from the superior mesenteric artery; and
the left colic artery from the inferior mesenteric artery.

The arterial supply to the descending colon includes:
the left colic artery from the inferior mesenteric artery.

The arterial supply to the sigmoid colon includes:
sigmoidal arteries from the inferior mesenteric artery.
The final segment of the colon (the sigmoid colon) begins above the pelvic inlet and extends to the level of vertebra SIII, where it is continuous with the rectum. This S-shaped structure is quite mobile except at its beginning, where it continues from the descending colon, and at its end, where it continues as the rectum. Between these points, it is suspended by the sigmoid mesocolon.
Rectum

It is extending from the sigmoid colon.

The recto-sigmoid junction is usually described as being at the level of vertebra SIII or at the end of the sigmoid mesocolon because the rectum is a retroperitoneal structure.

Rectum is curving forward with a loop to the left.

It has a peritoneal covering on the front and sides of its proximal third; only on its front for the middle third; and no covering for the distal third.
Anal Canal

Has 2 anal sphincters:
-Internal Anal Sphincter (smooth m.) = involuntary
-External Anal Sphincter (skeletal m.)= voluntary

The upper part of the anal canal is lined by mucosa and is distinguished by a number of longitudinally oriented folds known as anal columns, which are united inferiorly by crescentic folds termed anal valves. Superior to each valve is a depression termed an anal sinus.

The anal valves together form a circle around the anal canal at a location known as the pectinate line, which marks the approximate position of the anal membrane in the fetus. Inferior to the pectinate line is a transition zone known as the anal pecten, which is lined by non keratinized stratified squamous epithelium. The anal pecten ends inferiorly at the anocutaneous line ("white line"), or where the lining of the anal canal becomes true skin.
Diverticulosis

is a herniation of colonic mucosa and submucosa through the muscular wall, with a diverticular expansion in the adventitia of the bowel visible on its external surface.

Common sites of development occur where neurovascular bundles penetrate the muscular wall of the bowel.
Colorectal Cancer

The cancer appears as polypoid and ulcerating, and spreads by infiltration through the colonic wall, by regional lymph nodes, and to the liver through portal venous tributaries.
**Volvulus**

Volvulus is the twisting of a bowel loop that may cause bowel obstruction and constriction of its vascular supply, which may lead to infarction.

Volvulus affects the small intestine more often than the large, and the sigmoid colon is the most common site in the large intestine; the mesenteric mobility of these portions of the bowel account for this higher occurrence at these sites. Volvulus is associated with dietary habits, perhaps a bulky vegetable diet that results in an increased fecal load.
Ulcerative Colitis

Like Crohn disease, ulcerative colitis is an idiopathic inflammatory bowel disease that begins in the rectum and extends proximally. Usually the inflammation is limited to the mucosal and submucosal layers of the bowel.

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<th>Characteristic</th>
<th>Description</th>
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<tbody>
<tr>
<td>Prevalence</td>
<td>70-150 cases/100,000 population (80% in rectosigmoid region)</td>
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<tr>
<td>Age</td>
<td>20-50 years; 50% affected are younger than 21 years</td>
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<tr>
<td>Signs and symptoms</td>
<td>Abdominal pain frequently relieved by defecation, diarrhea, fever, arthritis</td>
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</tbody>
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References

Gray's Anatomy for Students- Second edition

Clinically Oriented Anatomy, Keith L. Moore- Sixth edition

Netter’s Clinical Anatomy, Second edition