

The abdominal Esophagus, Stomach and the Duodenum

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Viscera of the abdomen

- Abdominal esophagus: Terminal part of the esophagus
- The stomach
- Intestines: Small and Large intestines
- Spleen
- Pancreas
- Liver
- Gallbladder
- Kidneys
- Suprarenal (adrenal) glands

The abdominal esophagus

- Short distal part of the esophagus located in the abdominal cavity.
- Enters abdomen through the right crus of the diaphragm, at the level of vertebra TX
- Passes from the esophageal hiatus to the cardiac orifice of the stomach just left of the midline

The abdominal esophagus

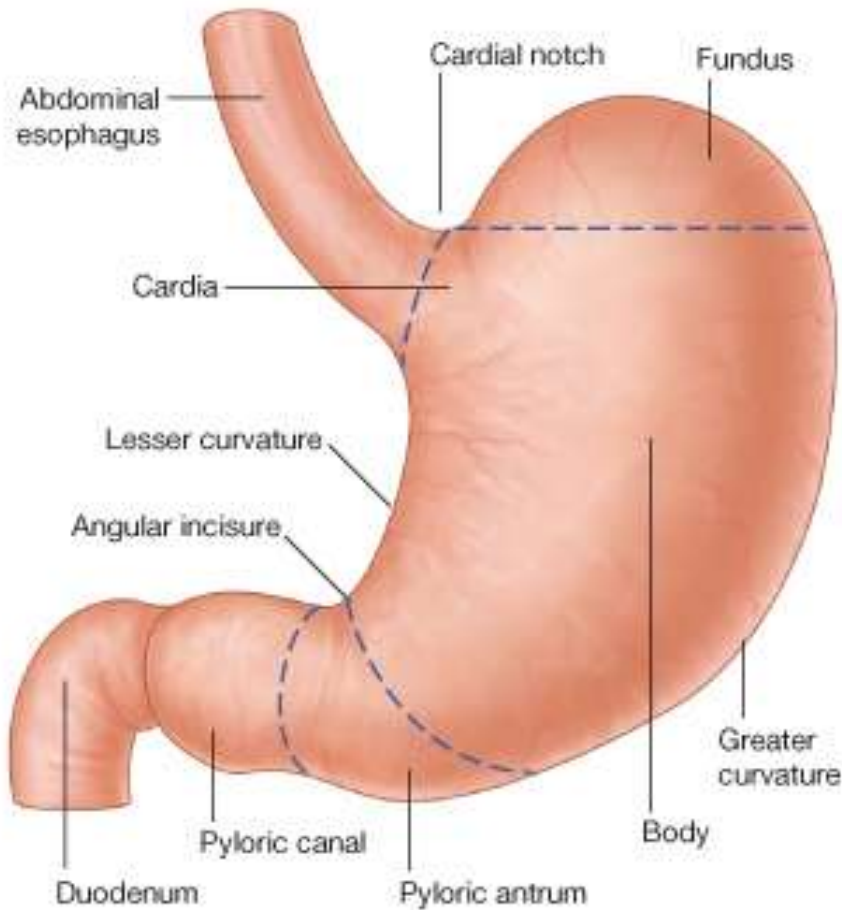
Accompanying structures:

- **Anterior vagal trunk** consists of several smaller trunks whose fibers mostly come from the left vagus.
- **Posterior vagal trunk** consists of a single trunk derived from the right vagus nerve

The stomach

- The most dilated part of the alimentary track
- Lie between the abdominal esophagus and the duodenum
- J-shaped.
- Position varies according to:
 - Body build (habitus)
 - Fullness of the stomach
 - Position of the patient
 - Movements of the diaphragm
- Can be found in the epigastric, umbilical, and left hypochondrium regions of the abdomen

Stomach: Parts



- **Cardia** surrounds the opening of the esophagus into the stomach
- **Fundus**= most superior portion area above the level of the cardiac orifice. Related to the left dome of the diaphragm
- **Body**= largest portion
- **Pylorus**= Distal consisting of the **pyloric antrum** and **pyloric canal**

Stomach: Inlet and outlet

The Inlet is the Cardiac Orifice.

- Left of the midline at the level of the 7th left costal cartilage and T11 vertebra.

The outlet is the pyloric orifice

- Marked on the surface of the organ by the **pyloric constriction**
- Surrounded by the **pyloric sphincter**: a thickened ring of circular muscle
- Located just to the right of midline in the **transpyloric plane**.

Stomach: Curvatures

- **Lesser curvature:**
 - Forms the shorter concave border of the stomach
 - Angular incisure (notch) is the sharp indentation approximately two thirds the distance along the lesser curvature that indicates the junction of the body and the pyloric part of the stomach
- **Greater curvature:**
 - forms the longer convex border of the stomach

Relations of The Stomach

- Entirely covered by peritoneum, except where blood vessels run along its curvatures and in a small area posterior to the cardiac orifice.
- Has two omental attachment:
 - i. Lesser omentum at the lesser curvature
 - ii. Greater omentum at the greater curvature

Relations of The Stomach

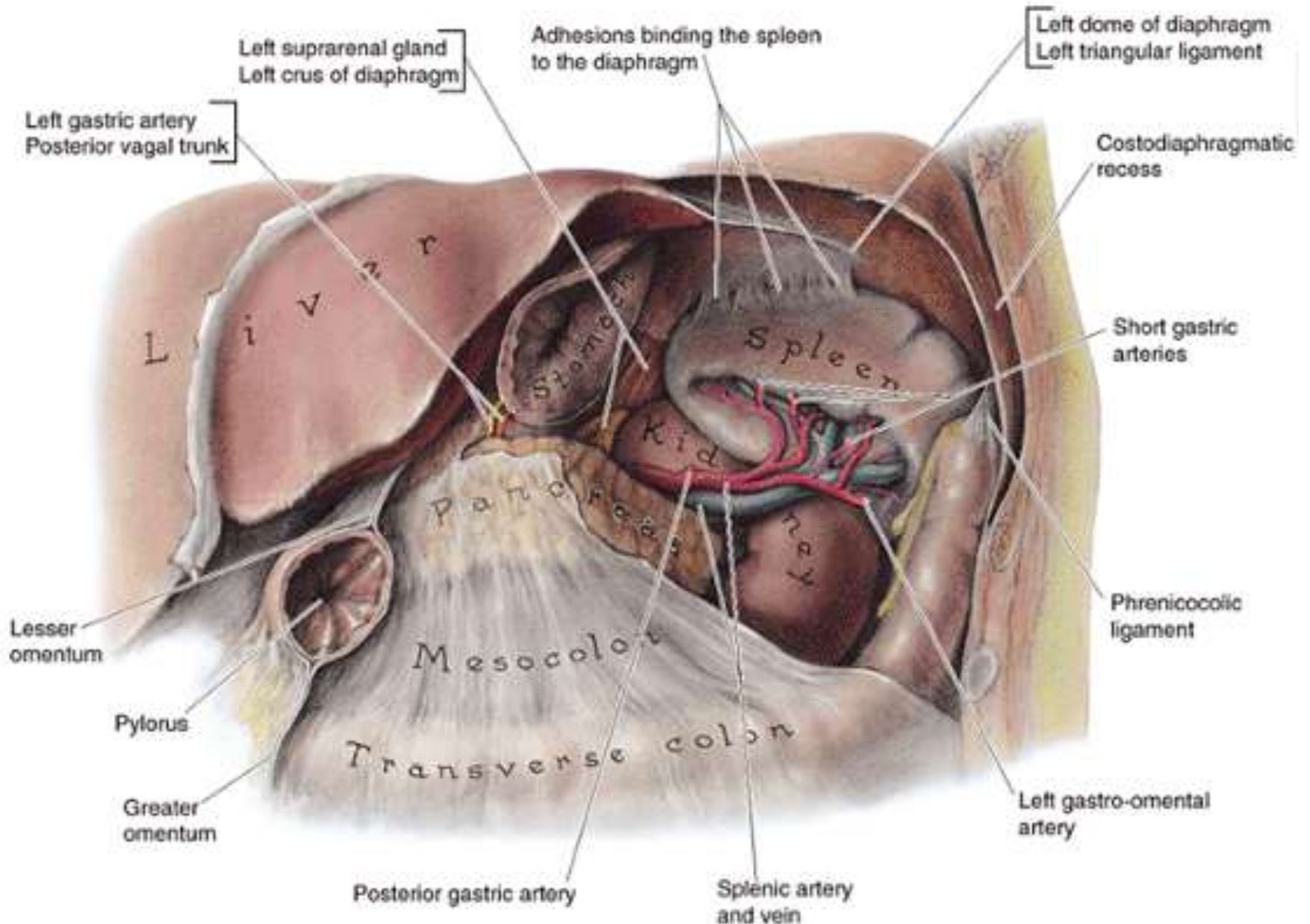
- **Anteriorly:** Diaphragm, the left lobe of liver, and the anterior abdominal wall.
- **Posteriorly:** Omental bursa and the structures forming the stomach bed

Relations of The Stomach

The Stomach bed:

- Stomach rests on these organs in supine position
- Formed by the structures forming the posterior wall of the omental bursa. (Stomach is the anterior wall of the bursa)
- From superior to inferior, the stomach bed is formed by the left dome of the diaphragm, spleen, left kidney and suprarenal gland, splenic artery, pancreas, and transverse mesocolon and colon

The Stomach bed

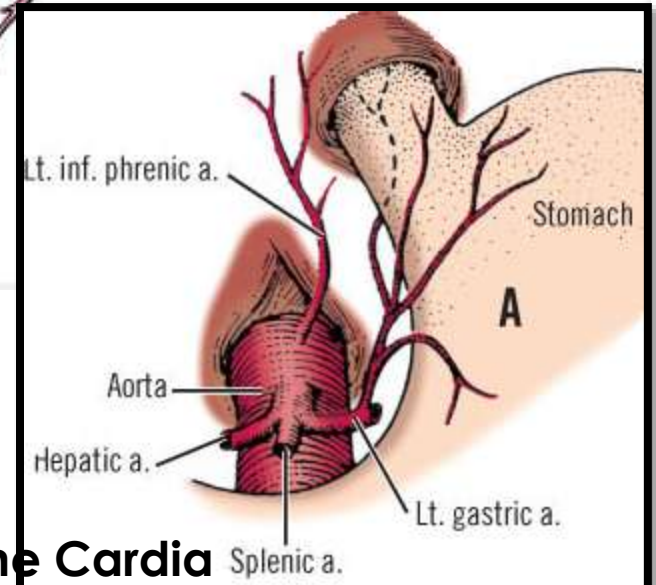
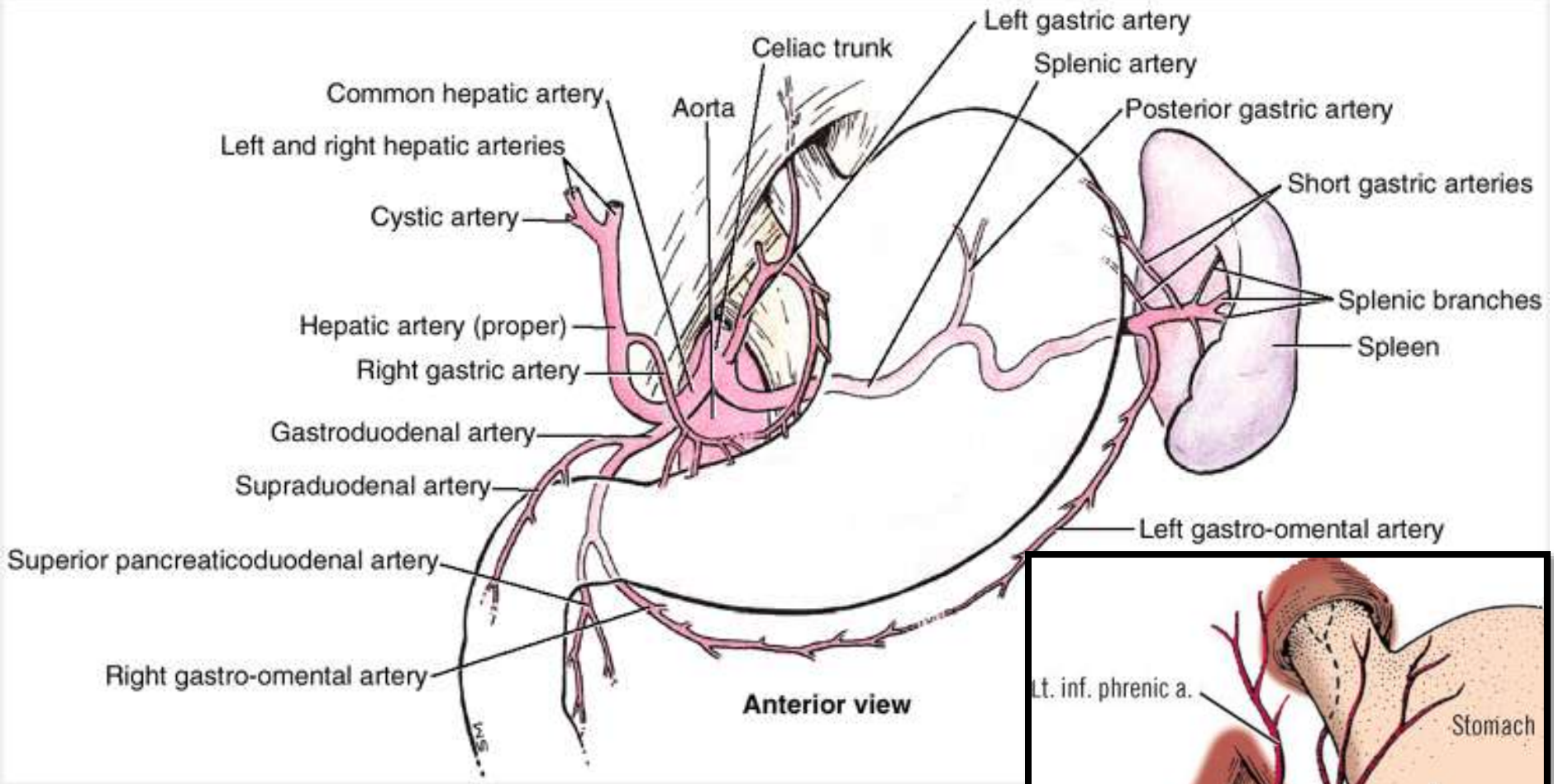


Vascular Supply

- Right and left gastric arteries
- Right and left gastro-omental arteries
- Short gastric arteries
- Inferior phrenic artery
- Gastrooduodenal artery

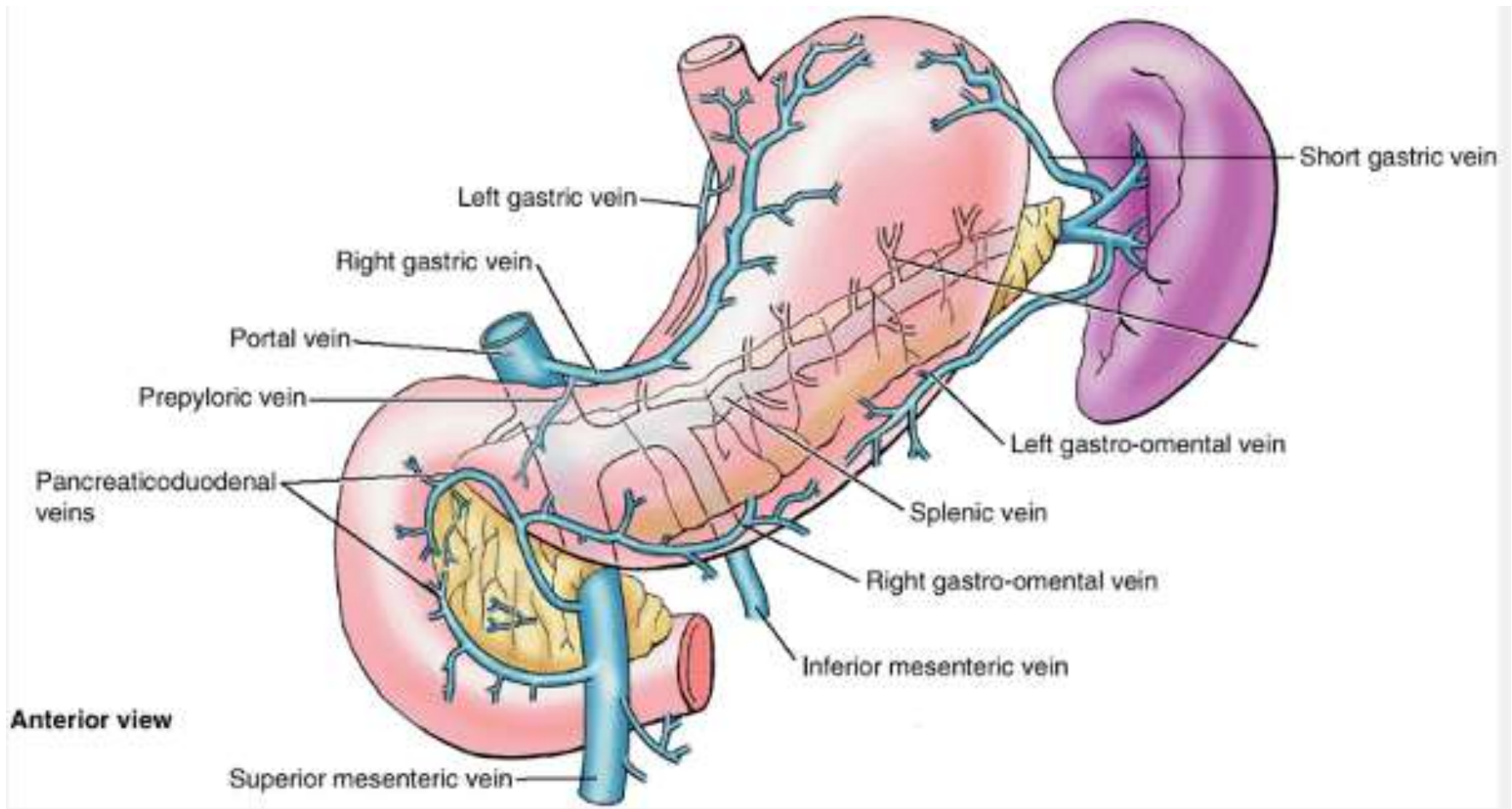
- **Venous drainage:**
- Right and left gastric veins drain to the portal Vein
- Right gastro-omental drains to the Superior mesenteric vein
- Left gastro-omental drains to the splenic

Vascular Supply: Arteries



Supply of the Cardia

Vascular Supply: Veins



The prepyloric vein ascends over the pylorus to the right gastric vein. Surgeons use it for identifying the pylorus because it is easily identified.

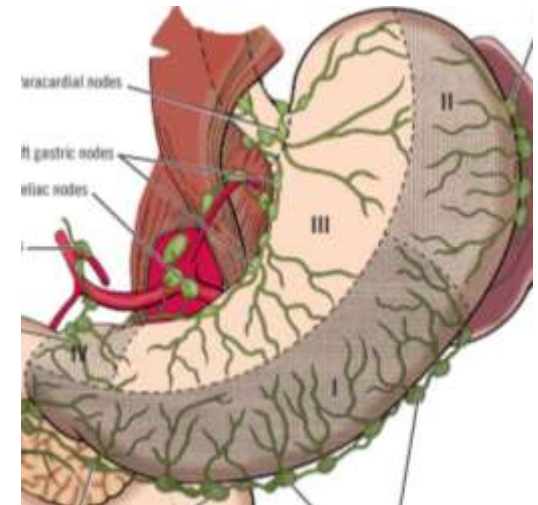
The Stomach: Lymph drainage

- The gastric lymphatic vessels accompany the arteries along the greater and lesser curvatures of the stomach.
- They drain lymph from its anterior and posterior surfaces toward its curvatures, where the gastric and gastro-omental lymph nodes are located

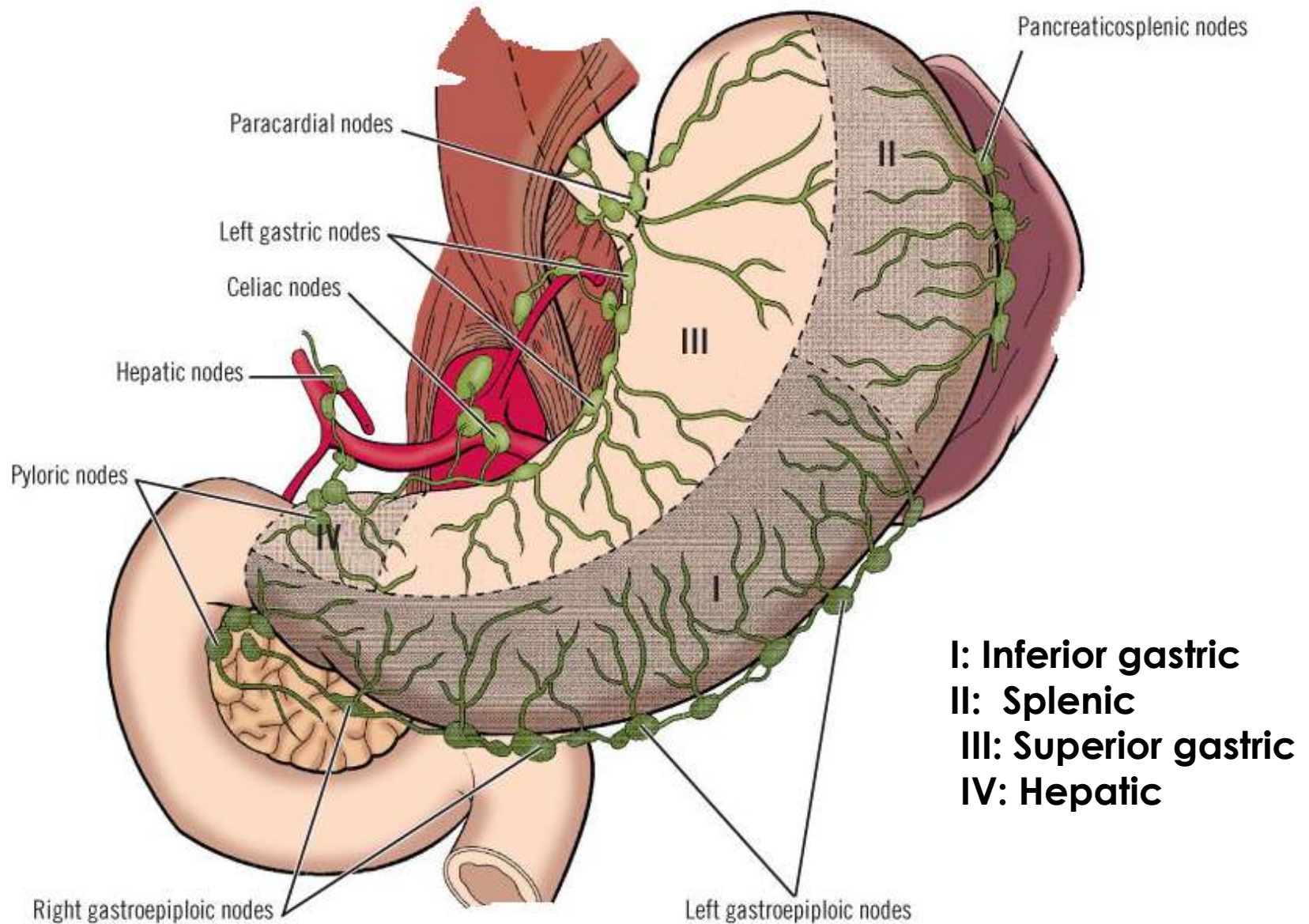
The Stomach: Lymph drainage

Arranged into 4 zones

- i. Zone I (inferior gastric) drains into the subpyloric and omental nodes
 - ii. Zone II (splenic) drains into the pancreaticosplenic nodes
 - iii. Zone III (superior gastric) drains into the superior gastric nodes
 - iv. Zone IV (hepatic) drains into the suprapyloric nodes
- Almost all eventually drains into the celiac group of lymph nodes



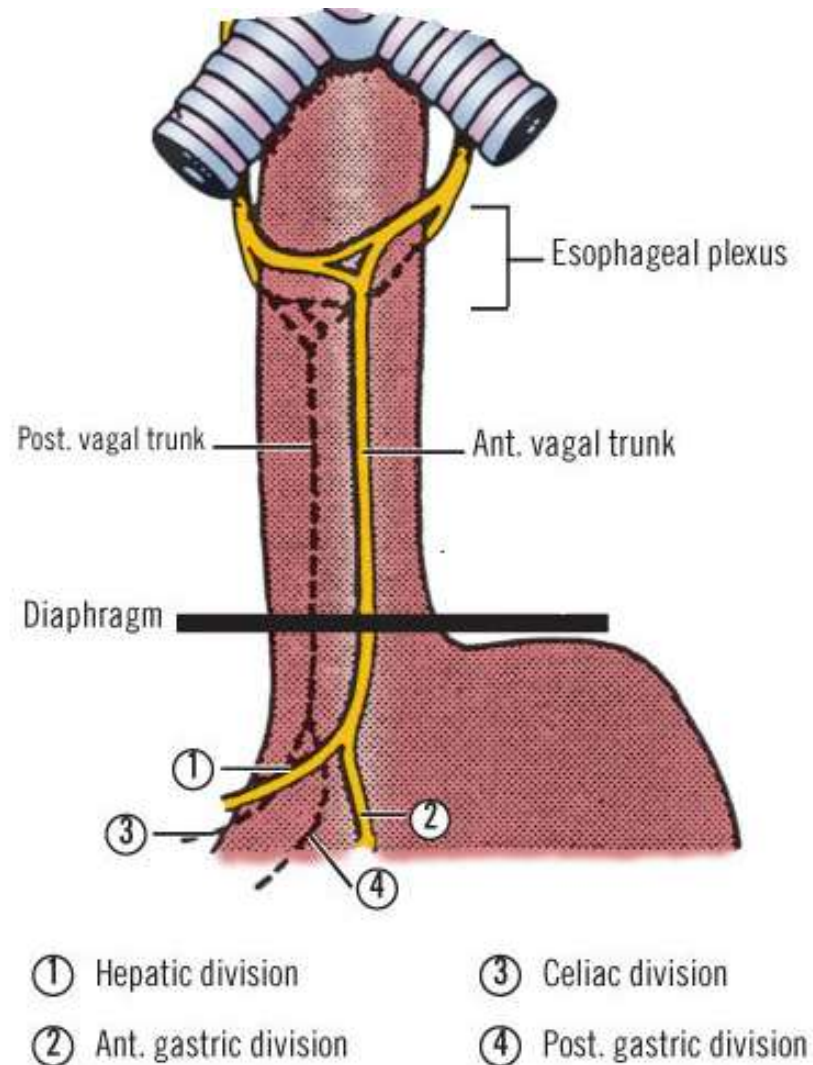
The Stomach: Lymph drainage



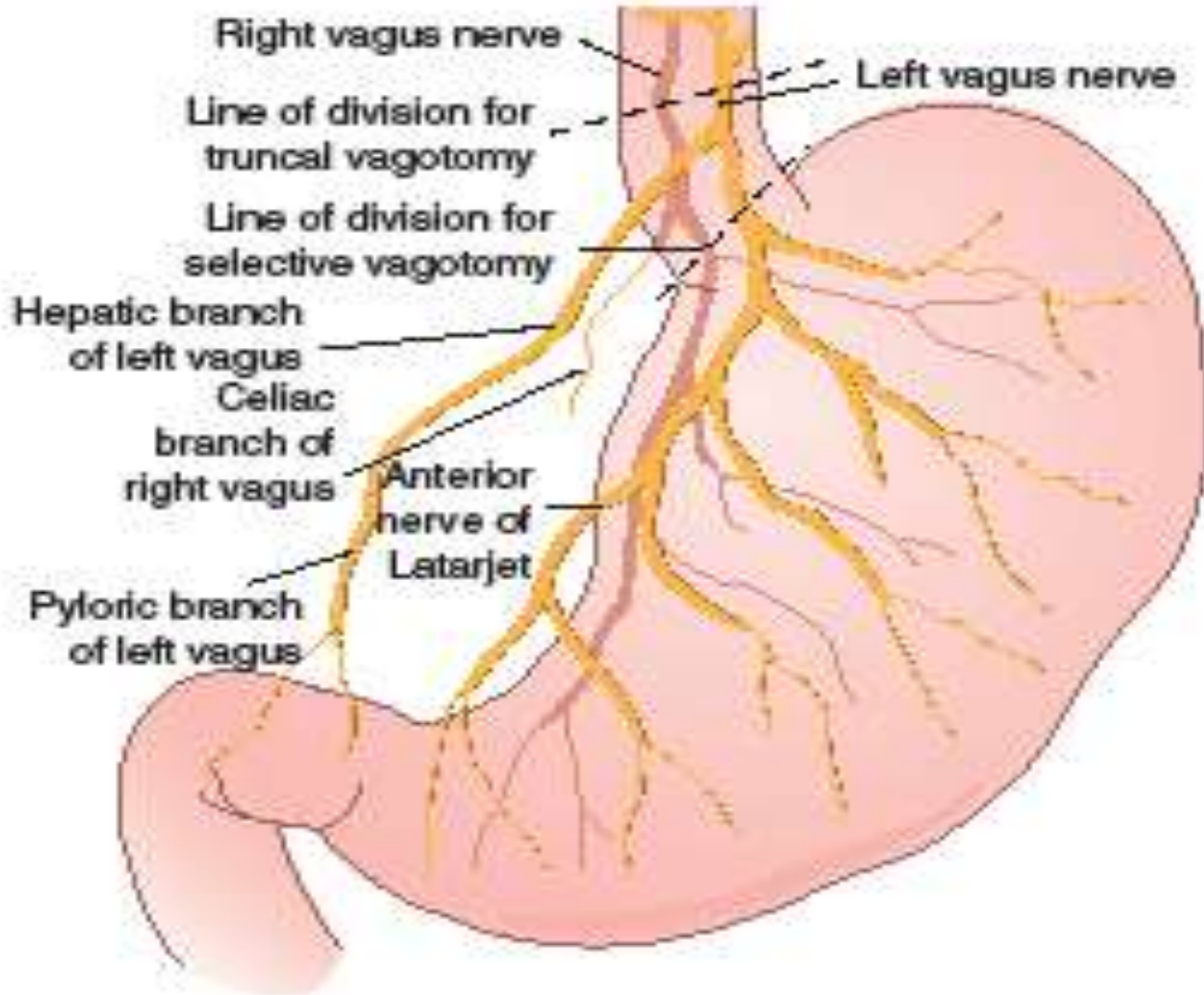
Nerve supply

- Parasympathetic supply
 - Anterior Vagus Trunk
 - Posterior Vagus Trunk
- Sympathetic supply:
 - Derived from T6-T9.
 - Through the Greater Splanchnic Nerve to the Coeliac Plexus and finally to the stomach

The vagus nerve



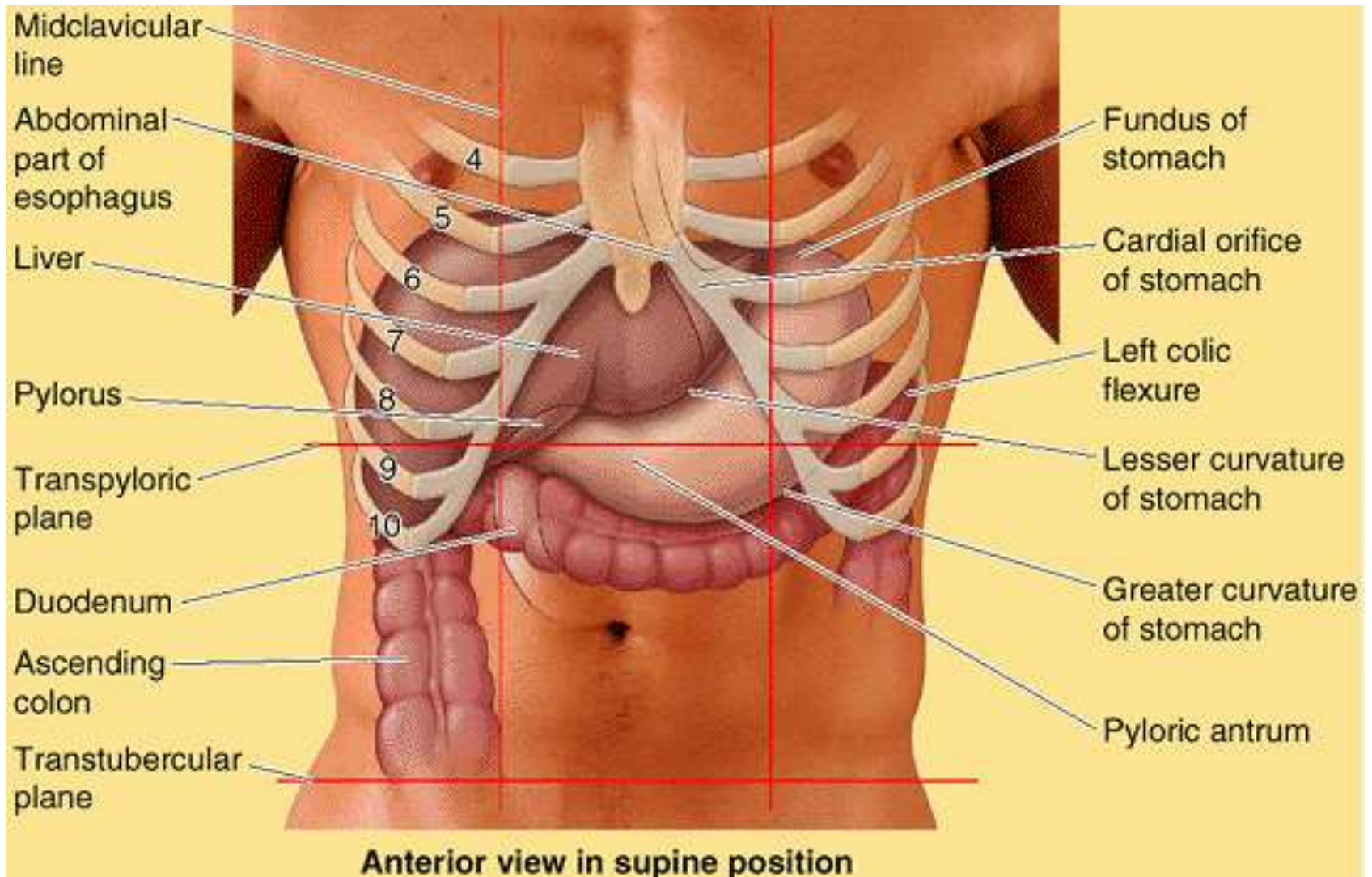
Nerve supply



Surface Anatomy

- **Cardial orifice:** posterior to the 6th left costal cartilage, 2 to 4 cm from the median plane at the level of the T11 vertebra. This is the most fixed part of the stomach.
- **Fundus:** posterior to the left 6th rib in the plane of the MCL.
- **Greater curvature:** which passes inferiorly to the left as far as the 10th left cartilage before turning medially to reach the pyloric antrum.
- **Lesser curvature:** which passes from the right side of the cardia to the pyloric antrum; the most inferior part of the curvature is marked by the angular incisure, which lies just to the left of the midline.
- **Pylorus** in the supine position: lies at the level of the 9th costal cartilages at the level of L1 vertebra; the pyloric orifice is approximately 1.25 cm left of the midline.
- **Pylorus** in the erect position: lies on the right side; its location varies from the L2 through L4 vertebra.

Surface Anatomy



Duodenum

- First part of the intestine
- Shortest part of the intestine: 25 cm
- Most fixed part of the intestine
- Begins at the pylorus (L2 Vertebral, 2-3 cm to the left)
- Ends at the duodenojejunal flexure
- Roughly c-shaped and relates to the pancreatic head
- Partly retroperitoneal

Duodenum: Divisions

- **Superior** (first) part: short (approximately 5 cm) and lies anterolateral to the body of the L1 vertebra.
- **Descending** (second) part: longer (7-10 cm) and descends along the right sides of the L1 to L3 vertebrae.
- **Horizontal** (third) part: 6-8 cm long and crosses the L3 vertebra.
- **Ascending** (fourth) part: short (5 cm) and begins at the left of the L3 vertebra and rises superiorly as far as the superior border of the L2 vertebra

- The first 2 cm of the duodenum is called the Ampulla and it is the only part that has a mesentery
- The remaining parts have no mesentery and are therefore retroperitoneal and immobile

Relations of the first part

- **Posteriorly:** common bile duct, portal vein, inferior vena cava, and gastroduodenal artery;
- **Anteriorly:** quadrate lobe of the liver;
- **Superiorly:** the epiploic foramen;
- **Inferiorly:** the head of the pancreas.

Duodenum: Second part

- Forms an acute angle with the first part
- Runs inferiorly around the head of the pancreas, to the right of the IVC
- Entirely retroperitoneal
- Receives the bile and pancreatic duct (pancreaticobiliary duct) at the Ampulla of Vater at about its mid point, posteromedially

Relations of the second part

- **Superiorly:** Gallbladder
- **Posteriorly:** to the hilum of the right kidney, the right ureter, the right renal vessels, the psoas major, and the edge of the inferior vena cava.
- **Anteriorly** to the right lobe of the liver, the transverse colon, and the jejunum.
- **Right side** is related to the ascending colon and the right colic flexure.

The Horizontal (3rd) Part

- Begins about 5 cm from the midline, to the right of the lower end of the third lumbar vertebra, at about the level of the subcostal plane
- Measures 10 cm in length
- Crosses from the right to the left

The Horizontal (3rd) Part: Relations

- **Anteriorly:** Superior mesenteric vessels and the root of the mesentery and the jejunum.
- **Posteriorly:** ureter, the right gonadal vessels, the psoas muscle, the inferior vena cava, the lumbar vertebral column, and the aorta.
- **Superiorly:** The head and the uncinata process of the pancreas. The inferior pancreaticoduodenal artery lies in a groove at the interface of the pancreas and the duodenum.
- **Inferiorly:** the small bowel, primarily to the jejunum.
- It ends to the left of the third lumbar vertebra.

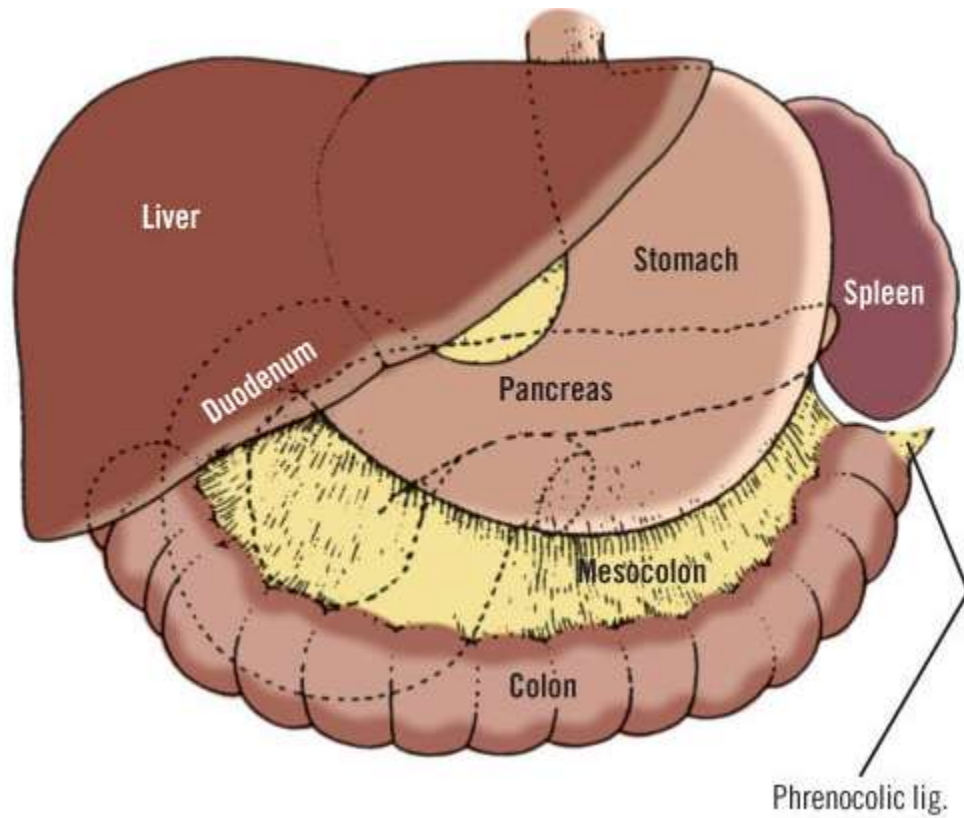
4th or ascending duodenum

- Directed obliquely upward.
- Ends at the duodenojejunal junction to the left and at the level of the second lumbar vertebra at the root of the transverse mesocolon

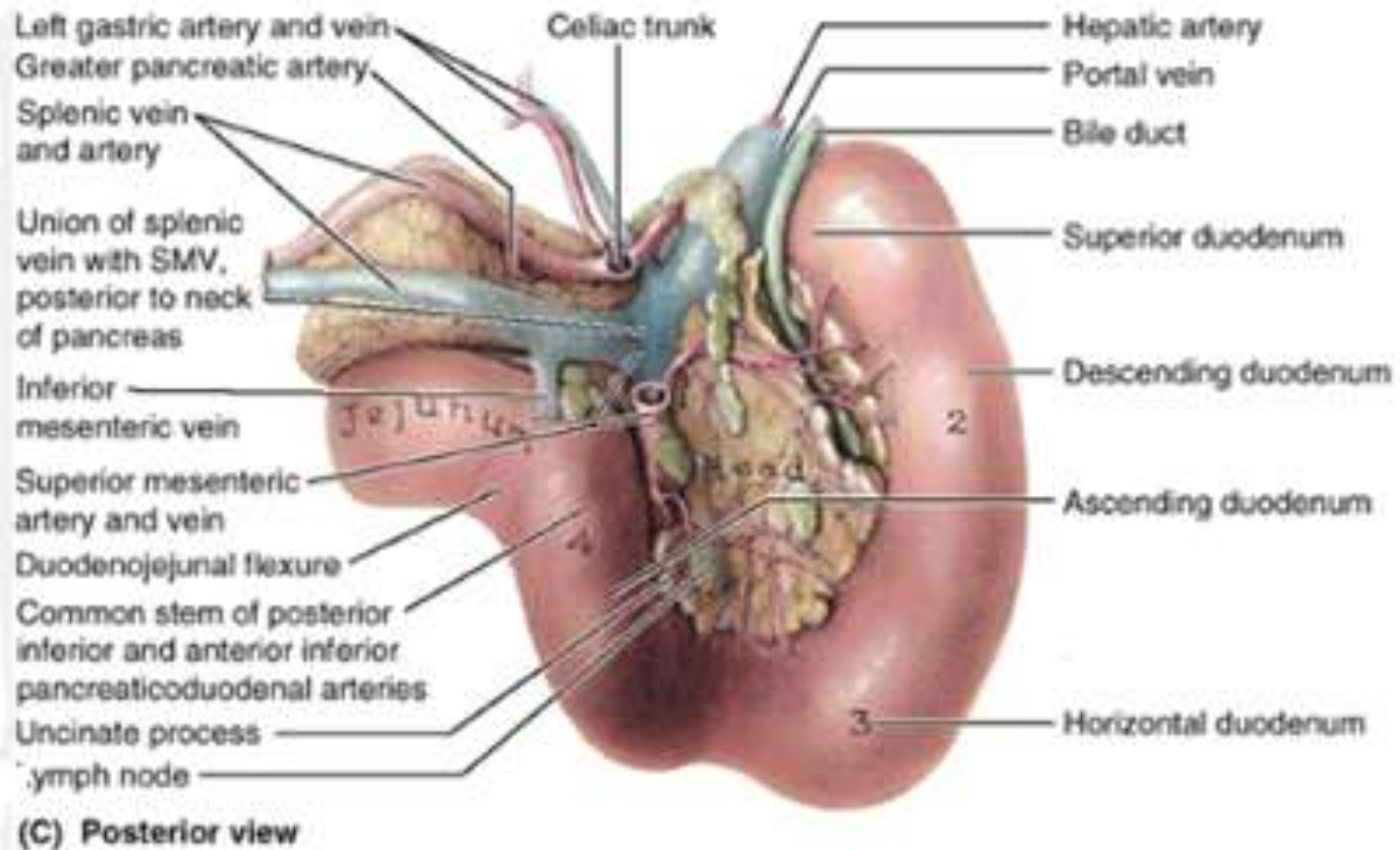
4th or ascending duodenum

- **Posteriorly** to the left sympathetic trunk, the psoas muscle, and the left renal and gonadal vessels.
- **Laterally** (to the **left**): Terminal part of the inferior mesenteric vein, the left ureter, and the left kidney.
- The duodenojejunal junction is suspended by the ligament of Treitz, a remnant of the dorsal mesentery, which extends from the duodenojejunal flexure to the right crus of the diaphragm
- The upper end of the root of the mesentery also attaches close to the junction.

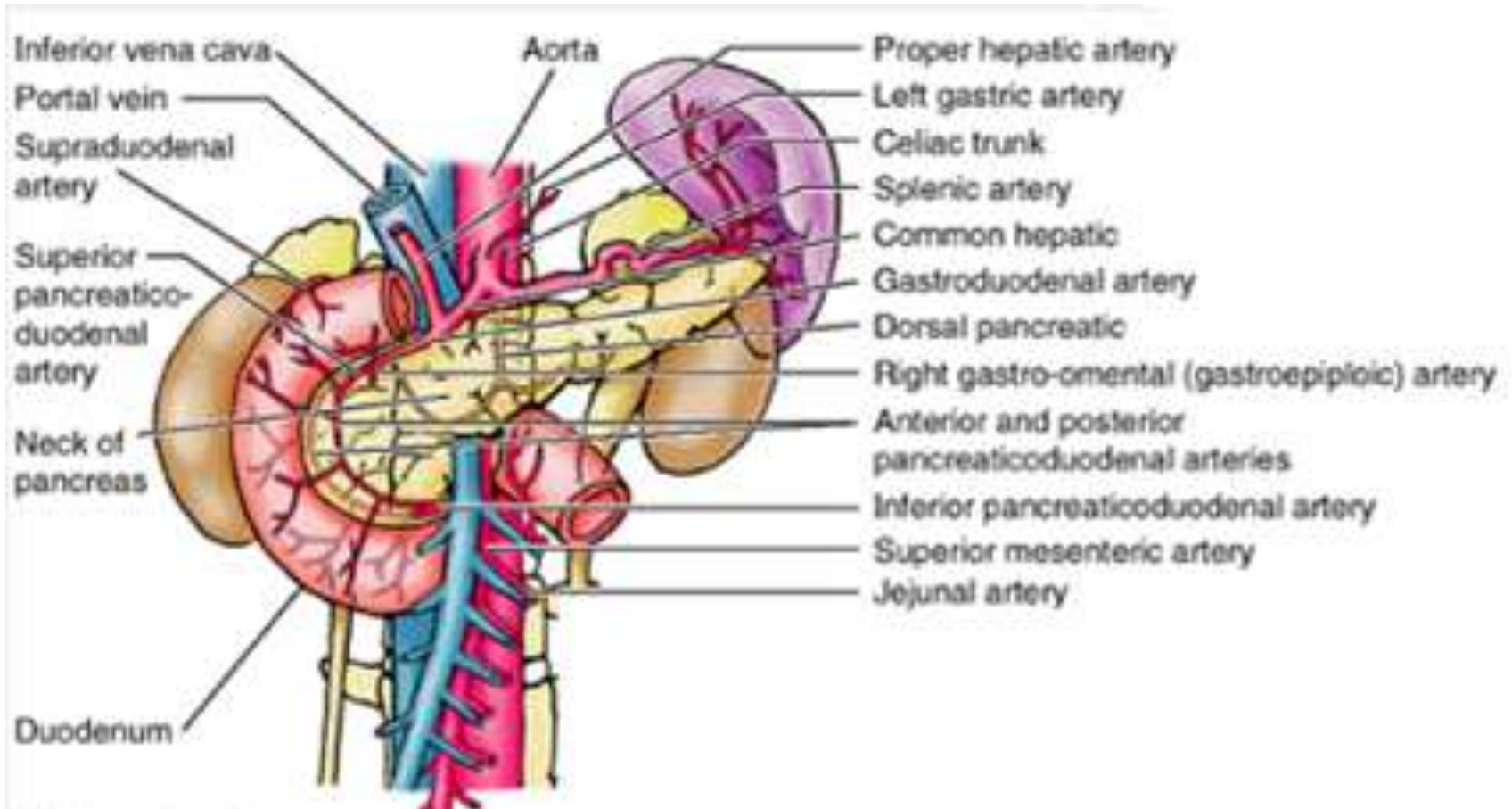
Relations of the Duodenum



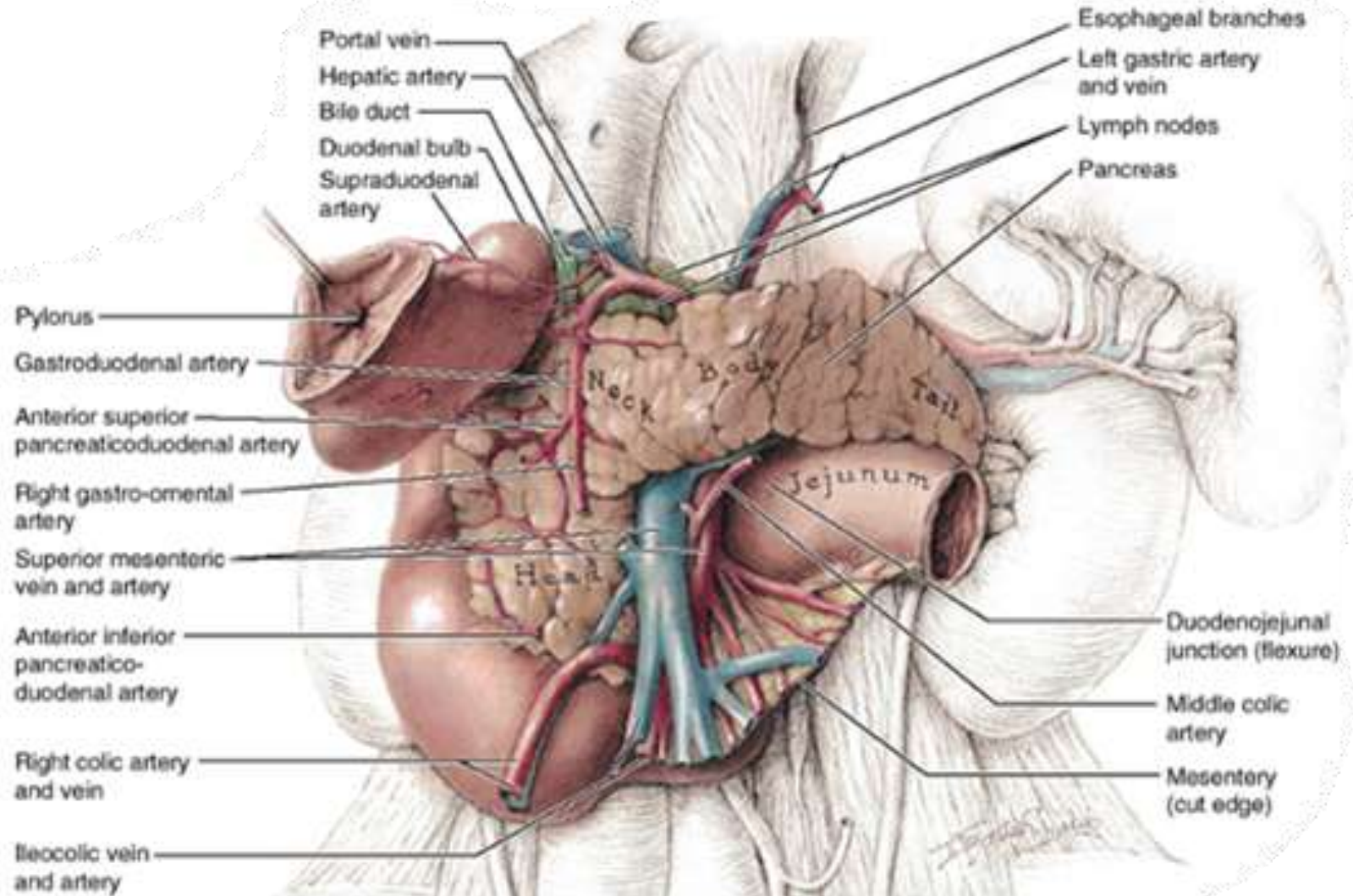
Relations of the Duodenum



Relations of the Duodenum

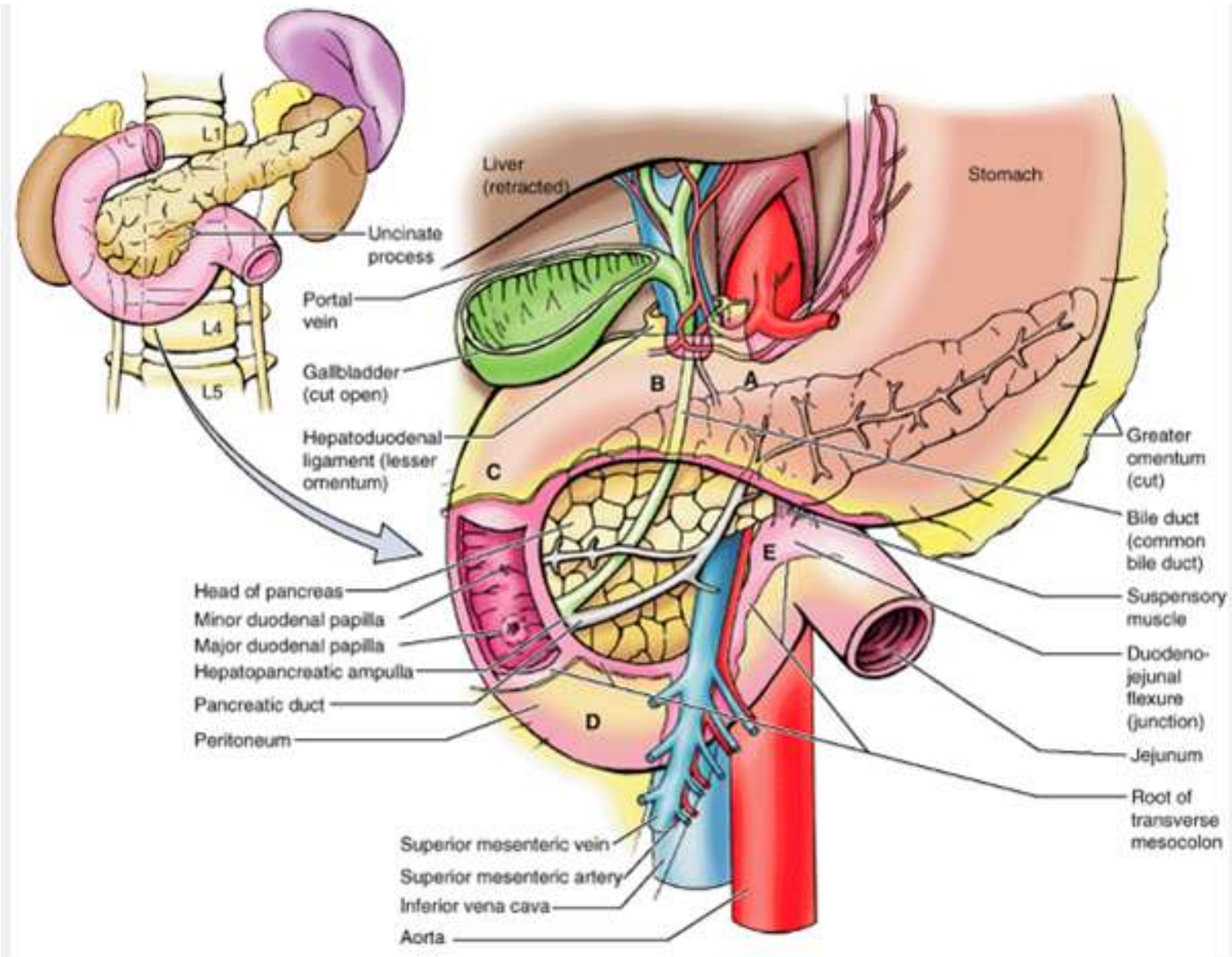


Relations of the Duodenum

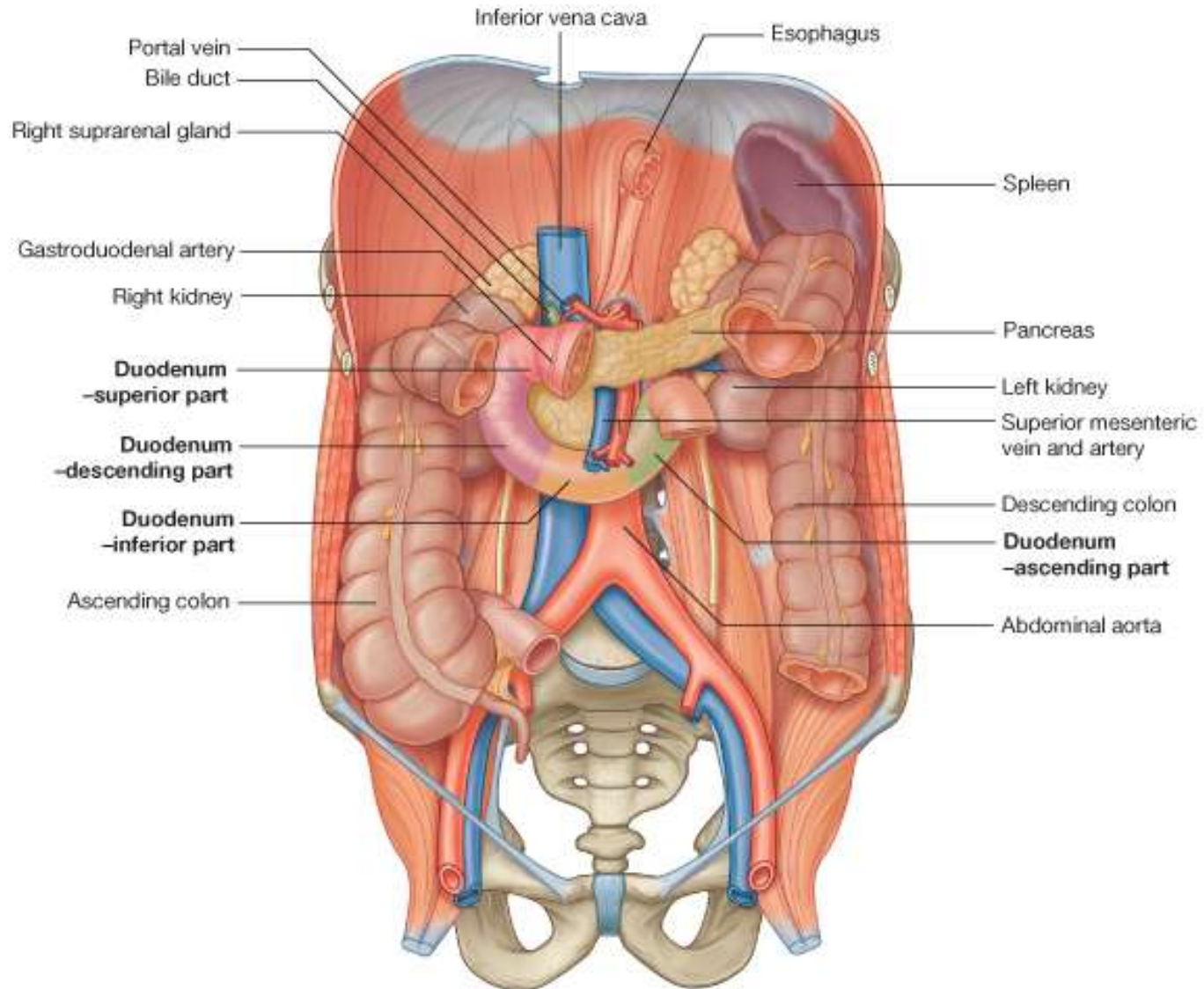


(B) Anterior view

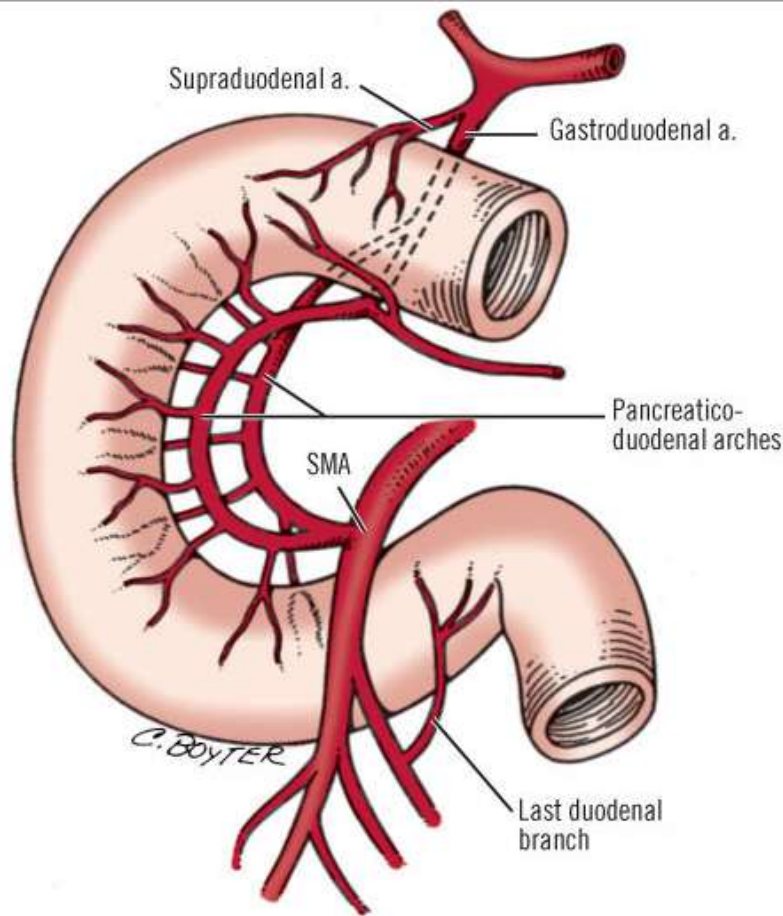
Relations of the Duodenum



Relations of the Duodenum

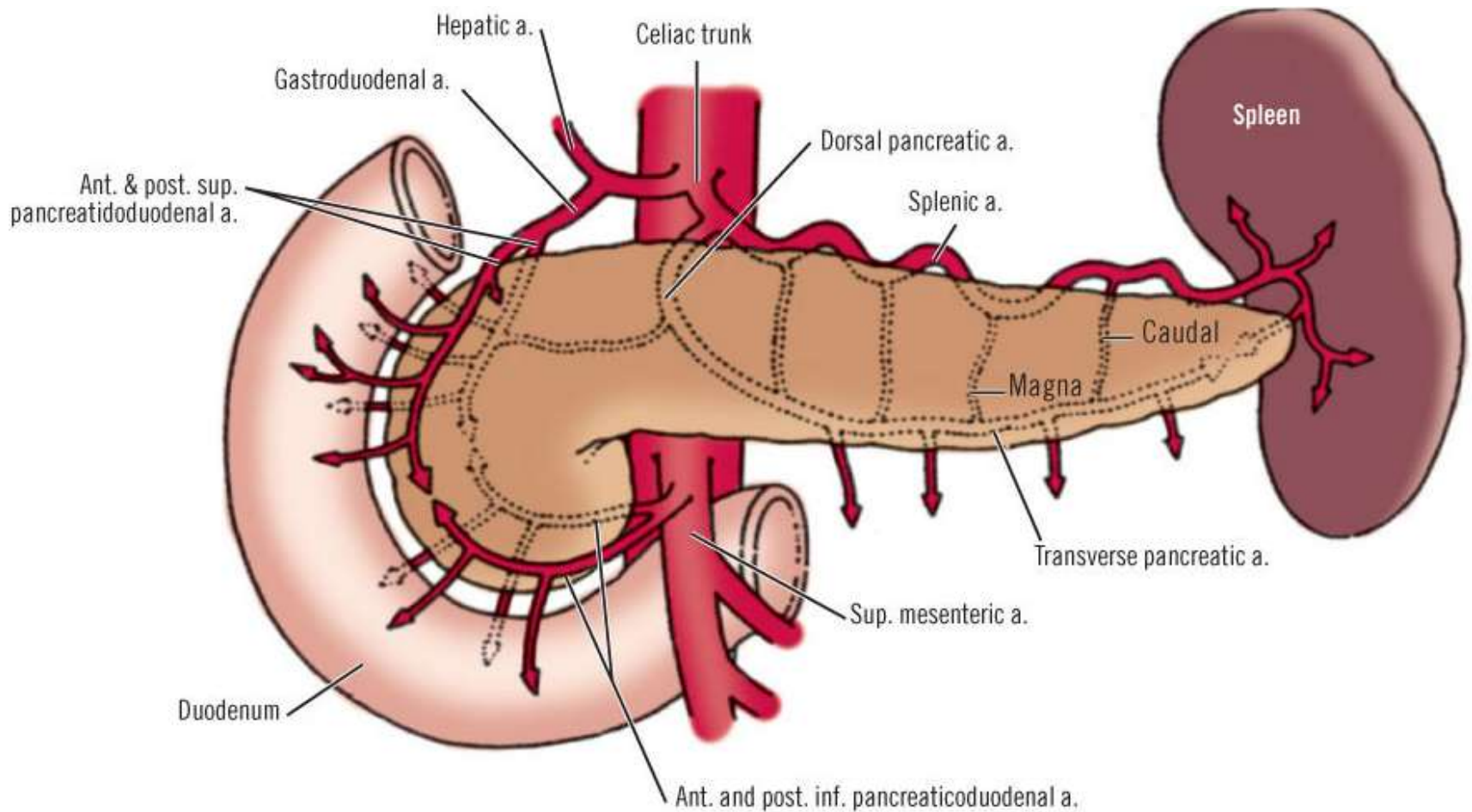


Duodenum: Arterial supply

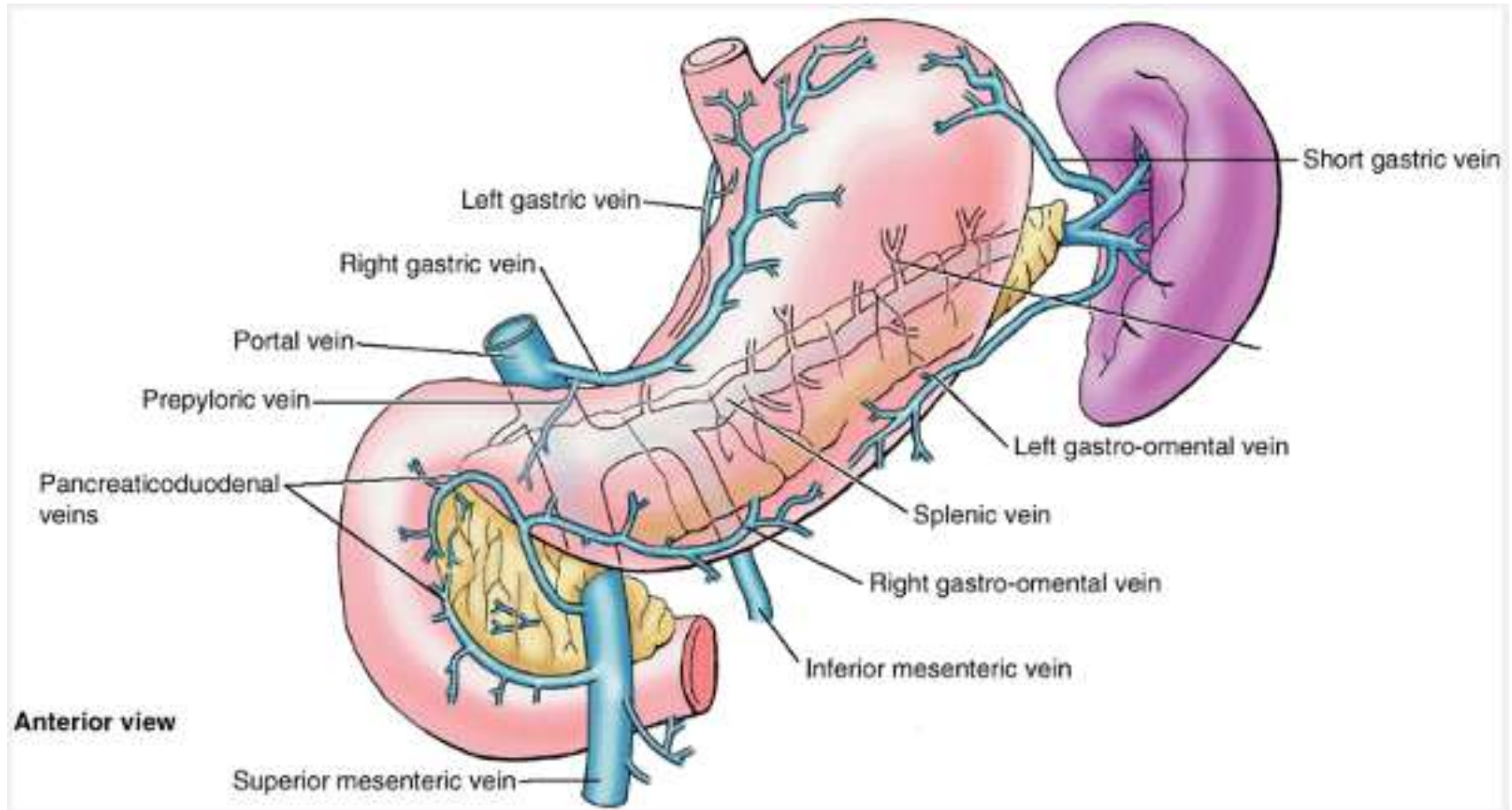


- Branches of Celiac trunk and the superior mesenteric artery
 - **Celiac trunk:** gastroduodenal artery and its branch, the superior pancreaticoduodenal artery
 - **SMA:** inferior pancreaticoduodenal artery
- Note:** demarcation between CT and SMA is the entry of the bile duct

Duodenum: Arterial supply



Venous supply



- The veins follow the arteries

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