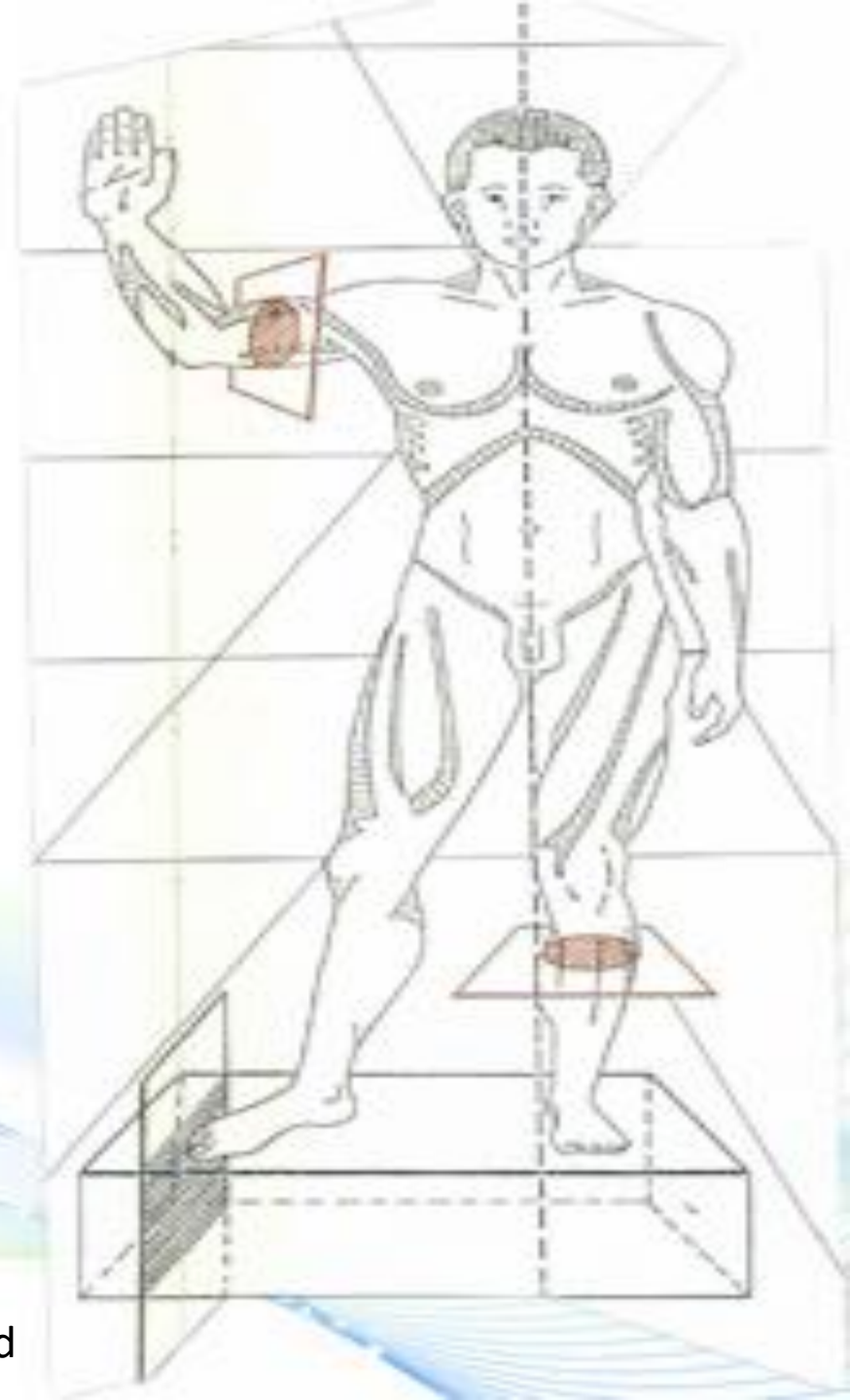


DUODENUM



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II. DESCRIPTIVE ANATOMY

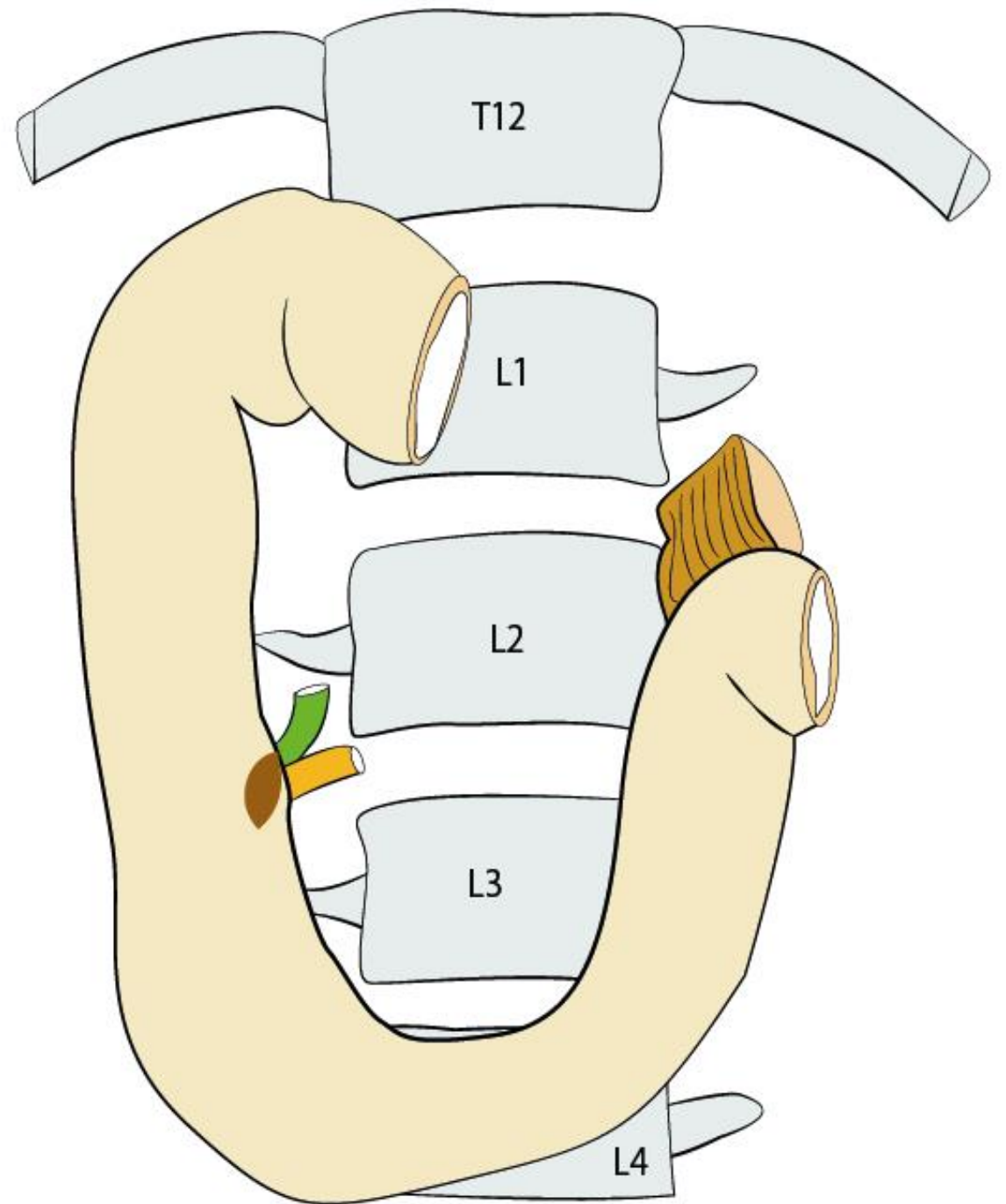
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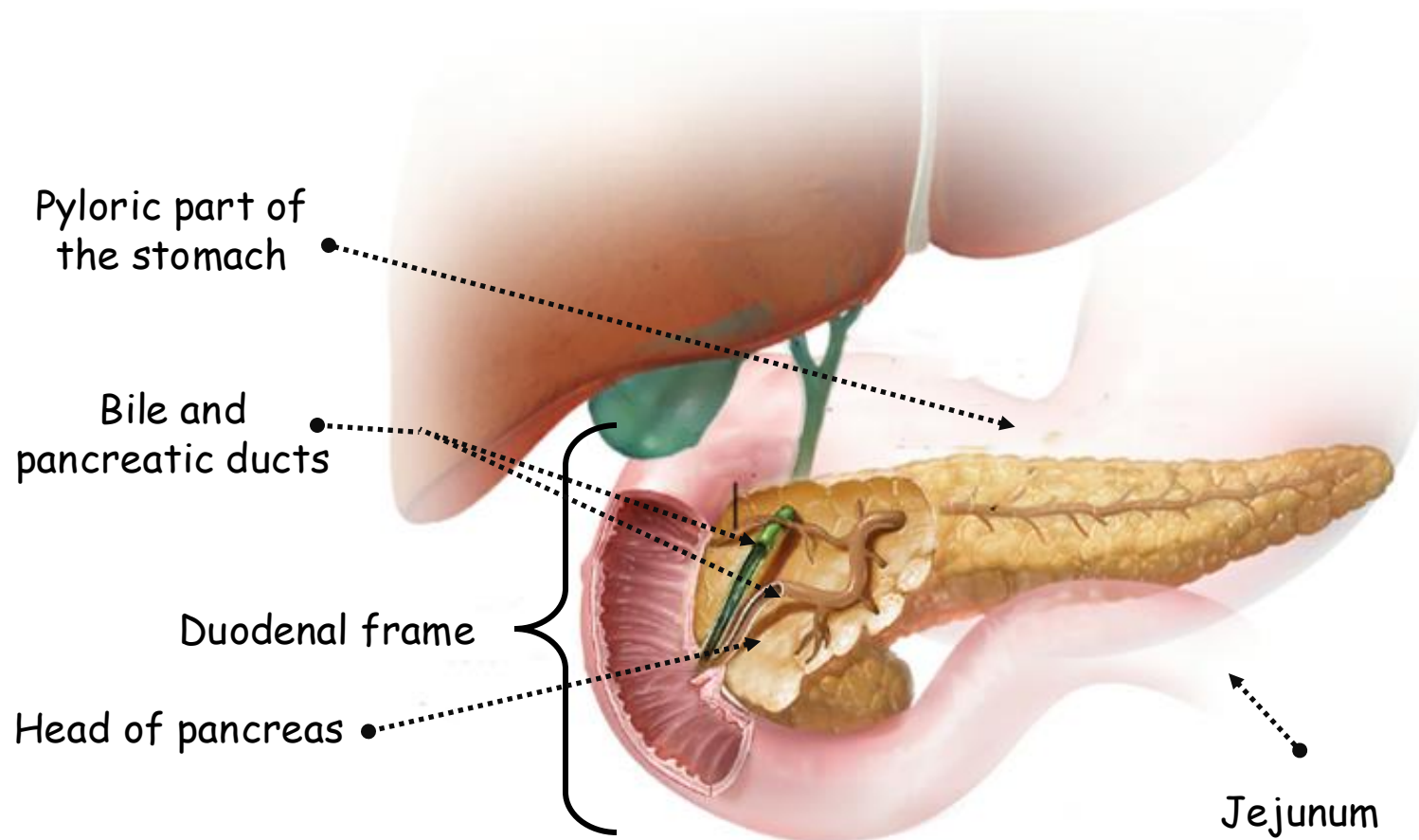
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VII. CONCLUSION



I. INTRODUCTION

- Initial portion of the small intestine
- Interposed between the pyloric part of the stomach and the jejunum
- Clinically the term **small intestine** often **excludes the duodenum**
- Shape of a **frame opened upwards, slightly backwards and to the left**
- Surrounds the **head of pancreas**
- Where the **pancreatic and bile ducts** communicate with the alimentary tube

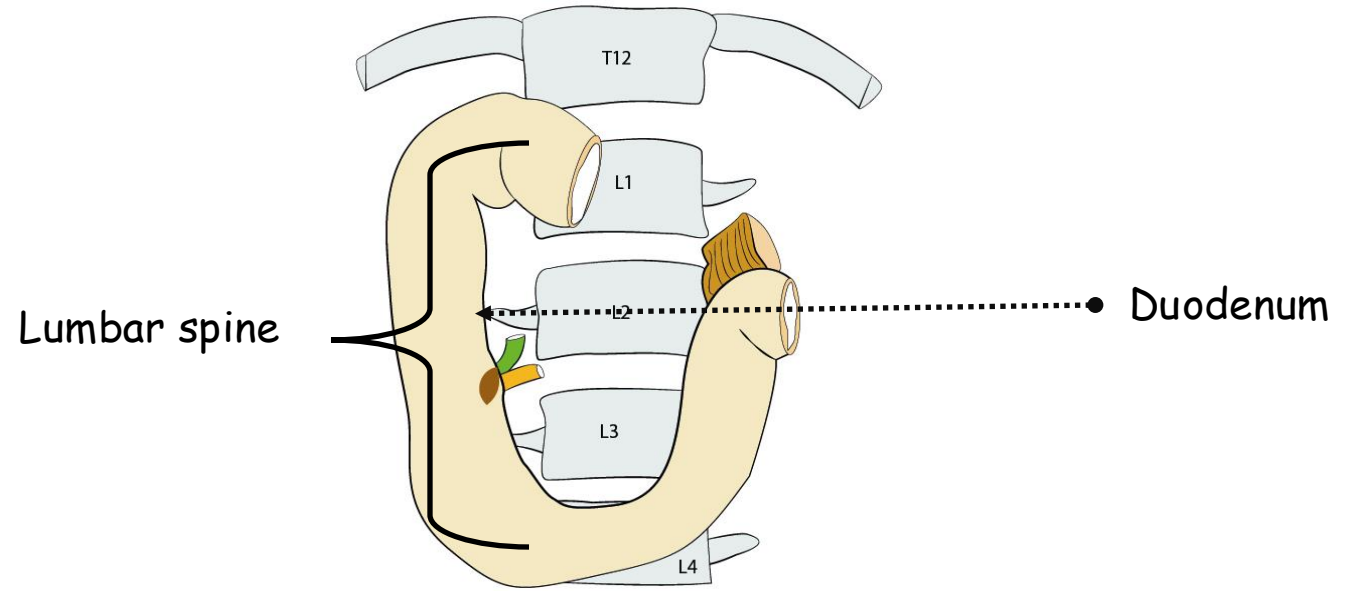


ANTERIOR VIEW OF THE DUODENUM AND PANCREAS

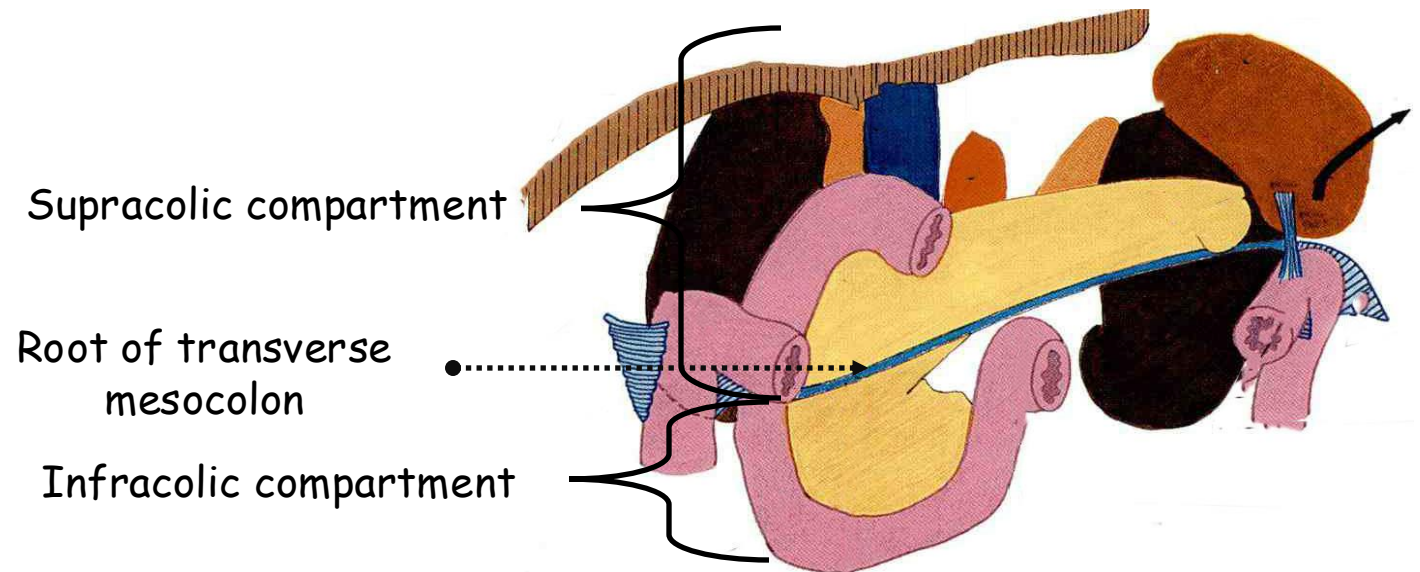
II. DESCRIPTIVE ANATOMY

A. SITUATION

- Almost entirely retroperitoneal
- Fixed and deep in the epigastric region
- Lies against the lumbar spine towards L1 to L4 vertebrae
- Crossed forwards by the root of the transverse mesocolon
- Thus, lies in both supracolic and infracolic compartments



DEEP ANTERIOR VIEW OF THE ABDOMEN



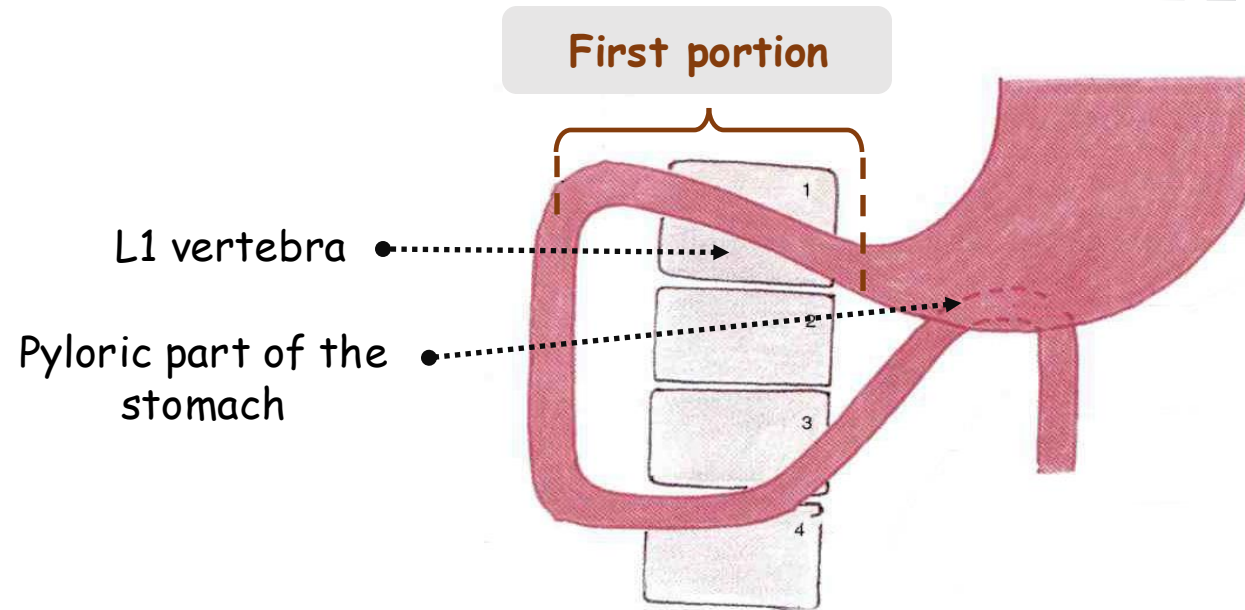
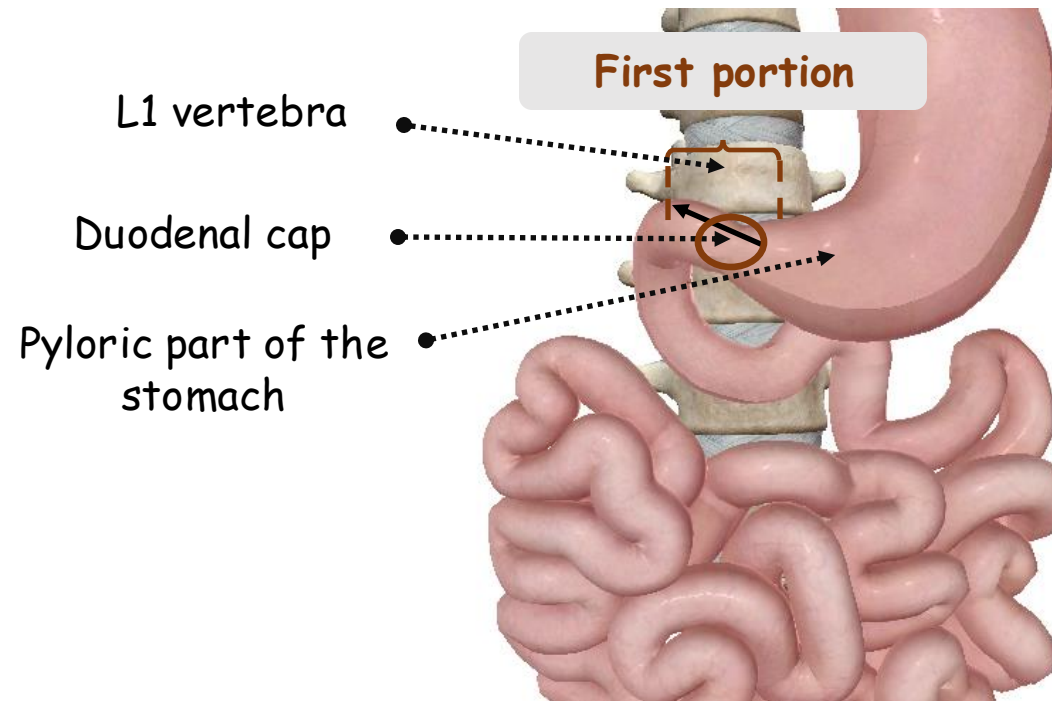
ANTERIOR VIEW OF THE DUODENUM AND PANCREAS

B. SHAPE

- C-shaped tube round the head of pancreas
- Curved over the convexity of the forwardly projecting aorta and inferior vena cava
- First 2 cm are contained between the peritoneum of the lesser and greater omenta
- Divided into four parts: superior, descending, horizontal and ascending

1. First portion of the duodenum:

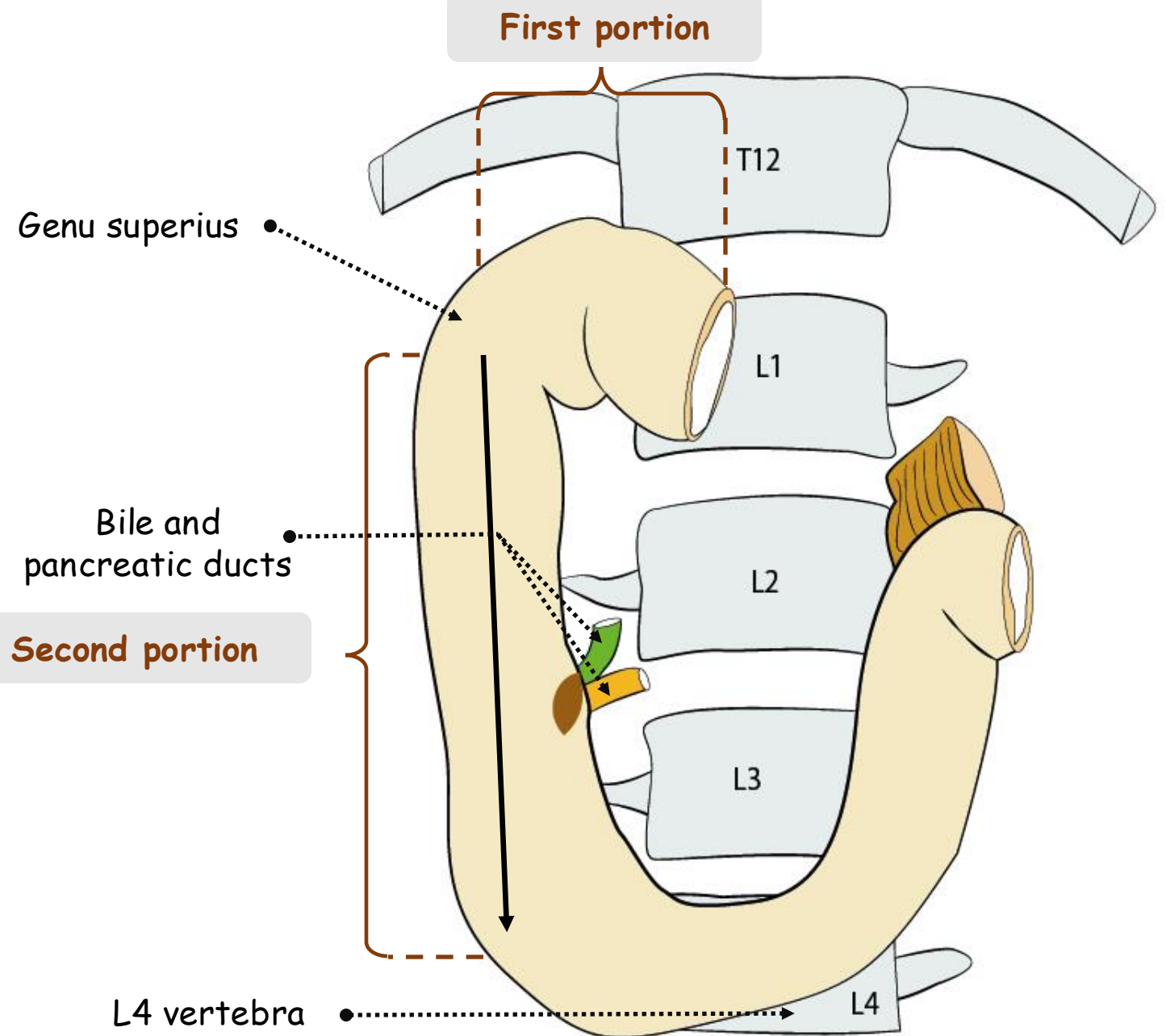
- Superior right portion
- Mobile and free
- At the level of L1 vertebra
- Runs to the right, upwards and backwards from the pylorus
- The first 2 cm constitutes the duodenal cap
- Lowermost boundary of the opening into the lesser sac upon the liver pedicle
- Next 3 cm pass backwards and upwards behind the peritoneum



ANTERIOR VIEW OF THE DUODENUM

2. Second portion of the duodenum:

- Curves downwards over the hilum of the right kidney
- Genu superius
- Vertical behind the posterior parietal peritoneum
- Crossed by the attachment of the transverse mesocolon
- Alongside the head of pancreas
- Lies on the right side of L2 to L4 vertebrae; upper half towards the supracolic compartment and lower towards the infracolic
- Its posteromedial wall receives the common opening of the bile duct and main pancreatic duct at the hepatopancreatic ampulla of Vater

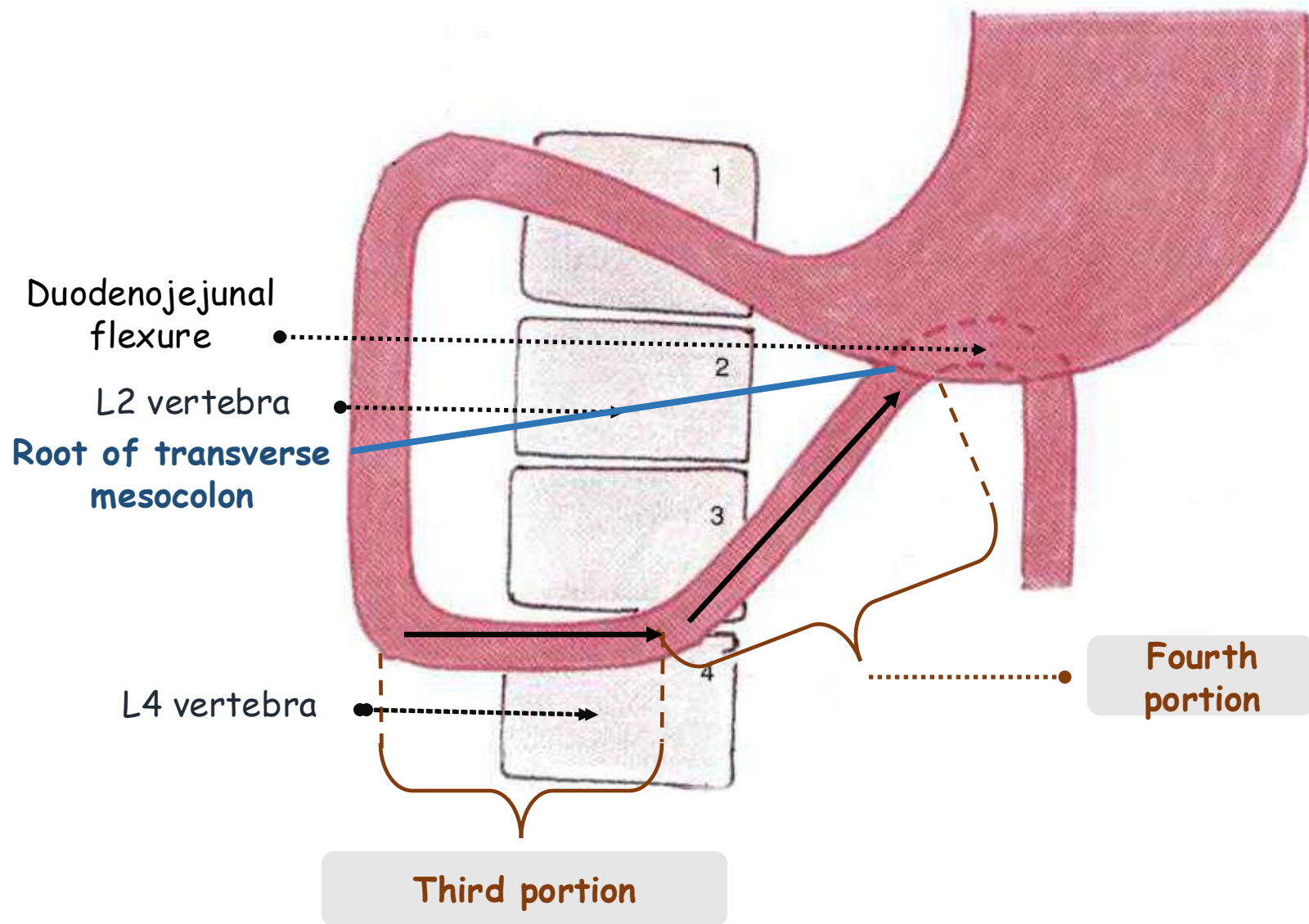


3. Third portion of the duodenum:

- Curves forwards from the right paravertebral gutter over the slope of the right psoas muscle and passes over the forwardly projecting inferior vena cava and aorta to reach the left psoas muscle
- Genu inferius
- Horizontal
- Covered by the peritoneum of the posterior abdominal wall just below the transverse mesocolon towards L4 vertebra

4. Fourth portion of the duodenum:

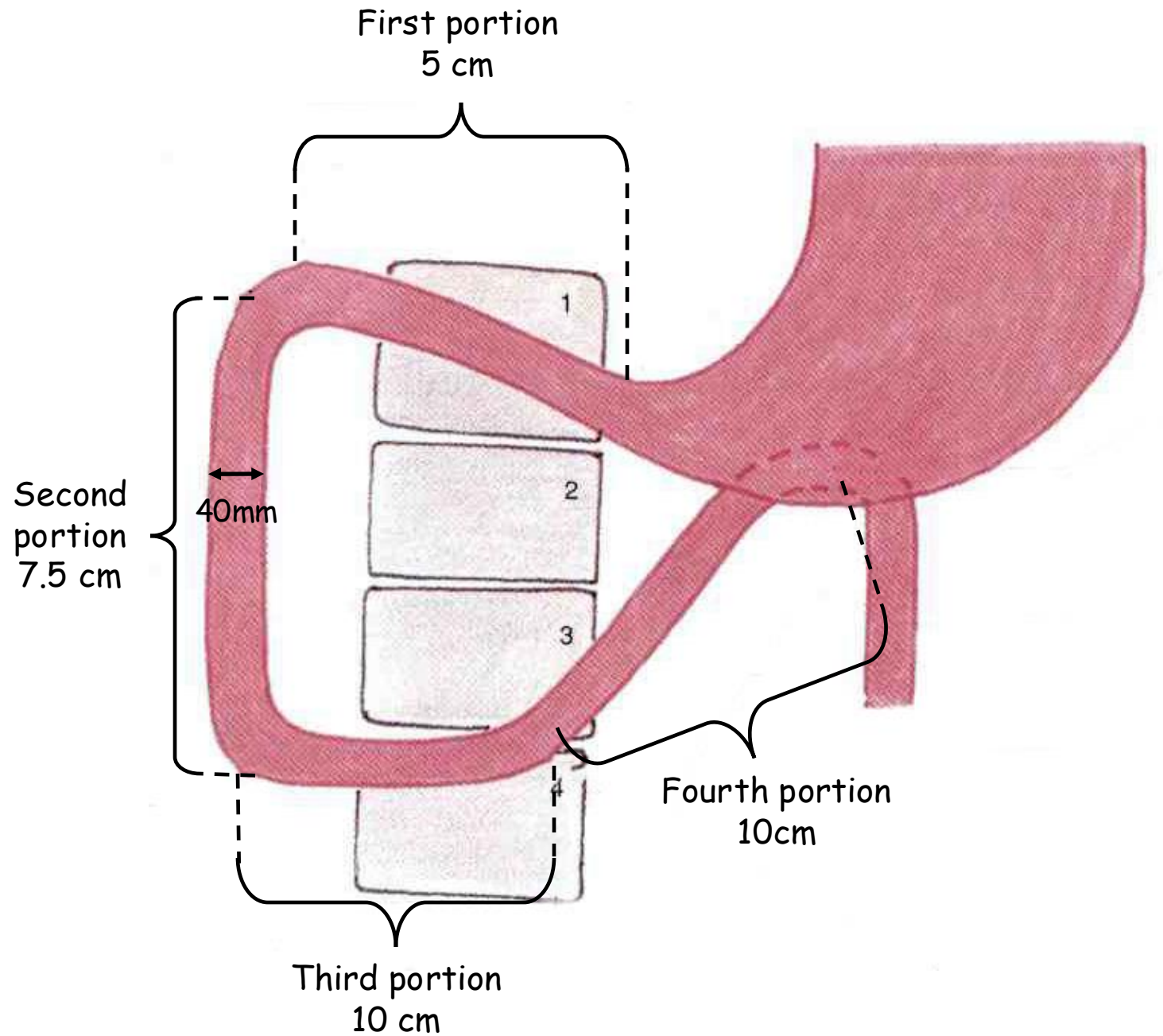
- Ascends to the left of the aorta lying on the left psoas to reach the lower border of the pancreas, almost as high as the root of the transverse mesocolon towards L2 vertebra
- Covered in front by the peritoneal floor of the left infracolic compartment
- Breaks free from the peritoneum curving forwards and to the right as the duodenojejunal flexure



ANTERIOR VIEW OF THE DUODENUM

C. DIMENSIONS

- Length: 25 cm
- 1st portion: 5 cm
- 2nd portion: 7.5 cm
- 3rd portion: 10 cm
- 4th portion: 2.5 cm
- Internal diameter: 4 cm

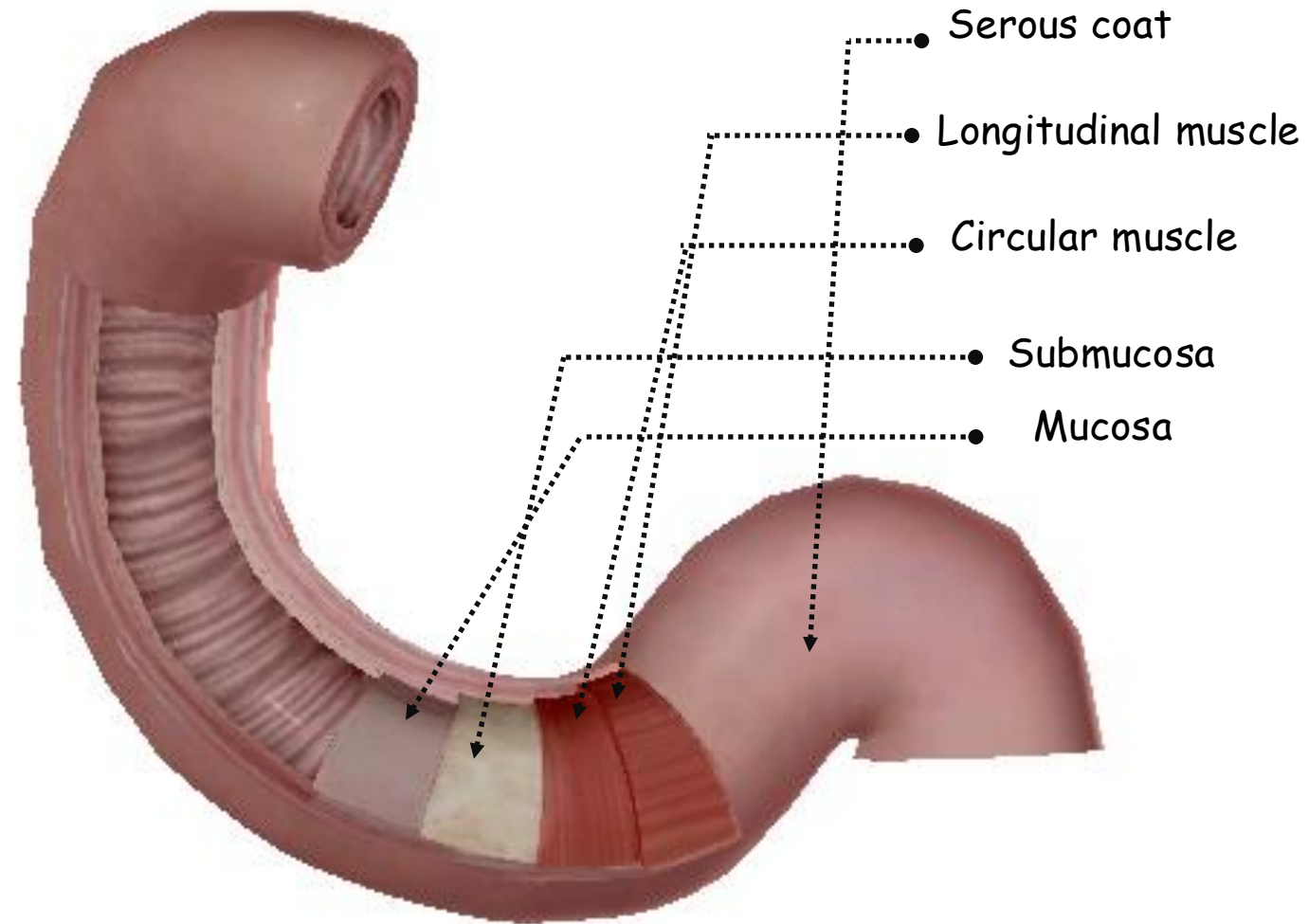


ANTERIOR VIEW OF THE DUODENUM

III. STRUCTURE

A. WALL OF DUODENUM

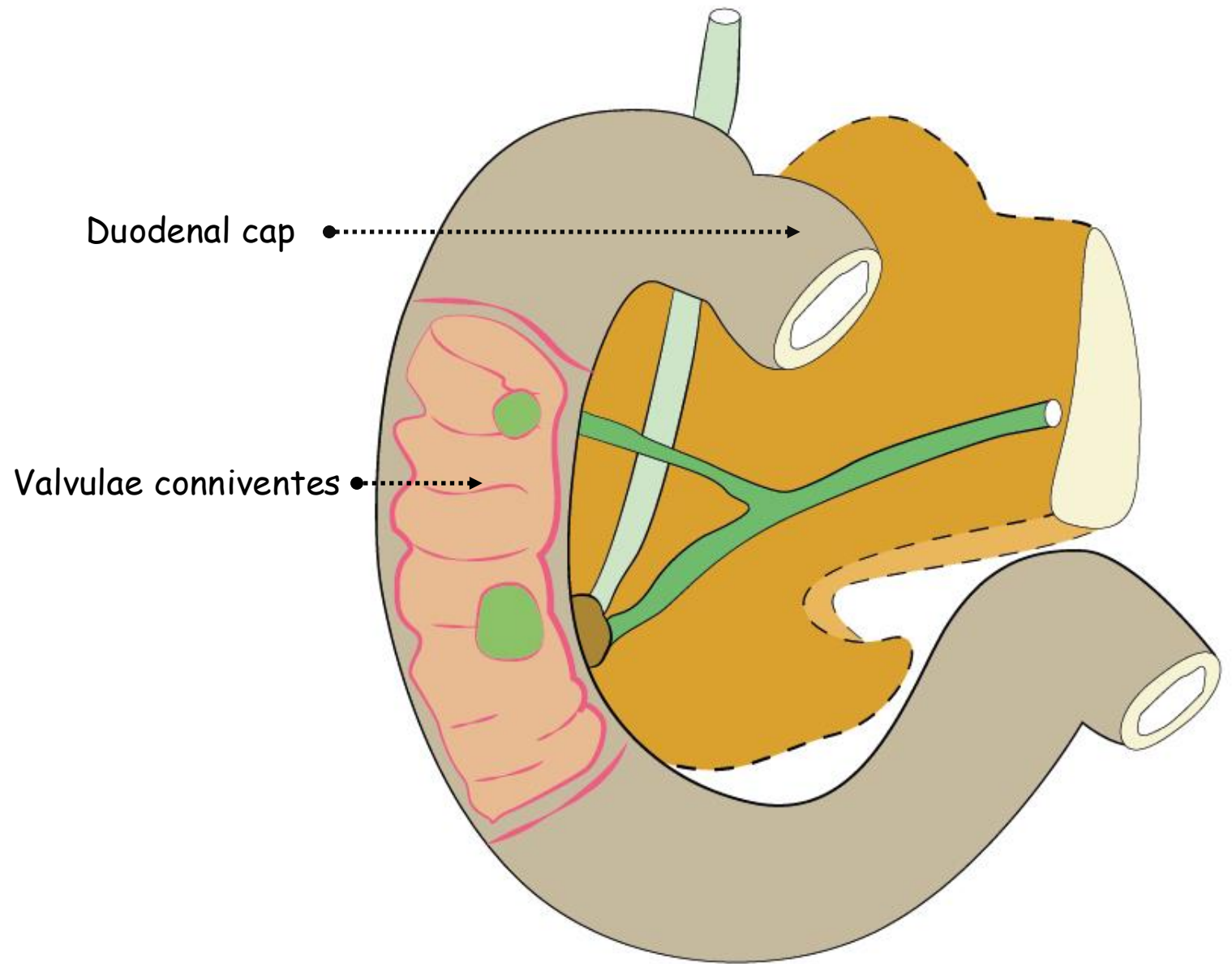
- Four layers
- Serous coat: peritoneum
- Muscle: outer longitudinal and inner circular
- Submucosa: characterized by the mucus-secreting glands of Brunner
- Mucosa: not only dips down to form the crypts of Lieberkuhn but is also thrown up between the gland openings into finger-like connective tissue villi, it is lined by columnar epithelium containing mucus-secreting goblet cells and enterocytes in the villi and granular Paneth cells which secrete lysozyme at the base of the crypts and enteroendocrine cells responsible for the production of intestinal hormones in the crypts



ANTERIOR VIEW OF THE DUODENUM SHOWING THE STRUCTURE OF ITS WALL

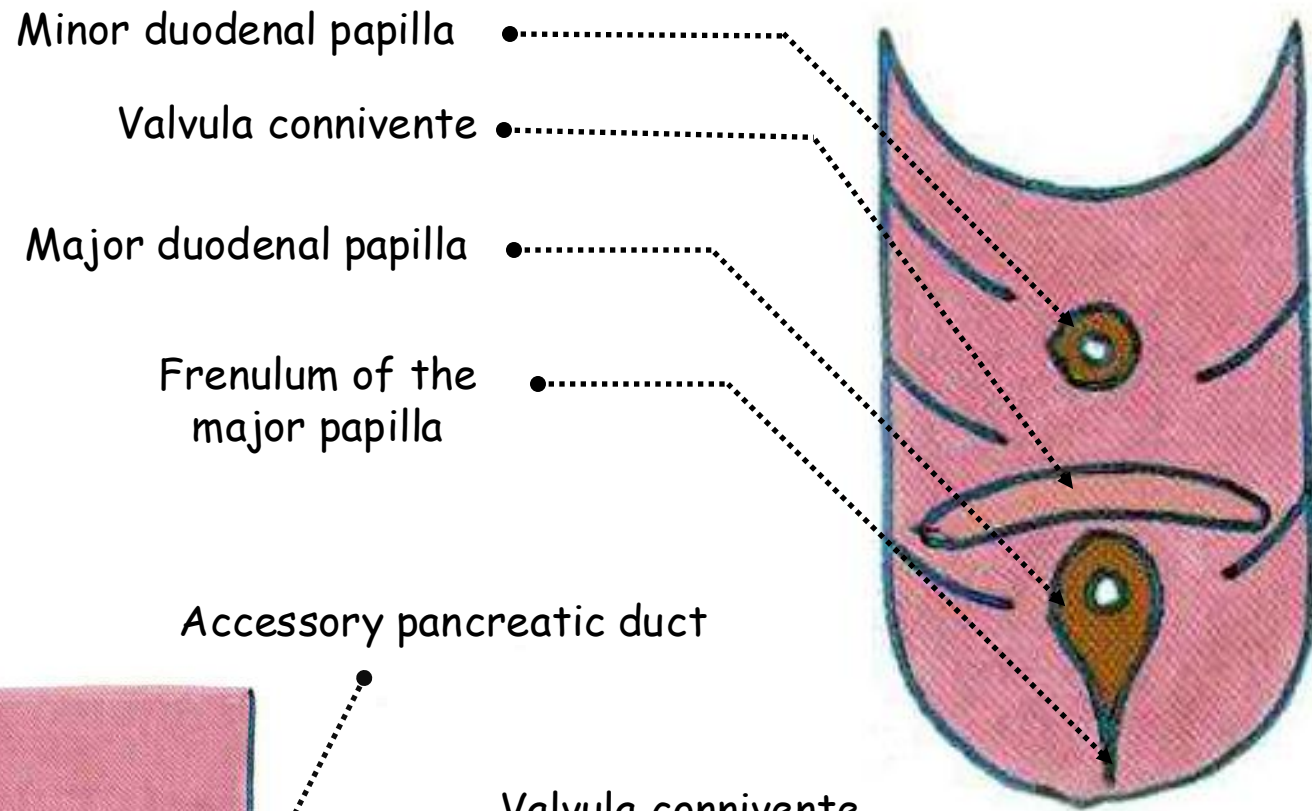
B. LUMEN OF DUODENUM

- Dilated in the duodenal cap
- Macroscopic aspect of mucosa:
 - Numerous circular folds, *plicae circulares* or *valvulae conniventes*
 - Smooth in the duodenal cap

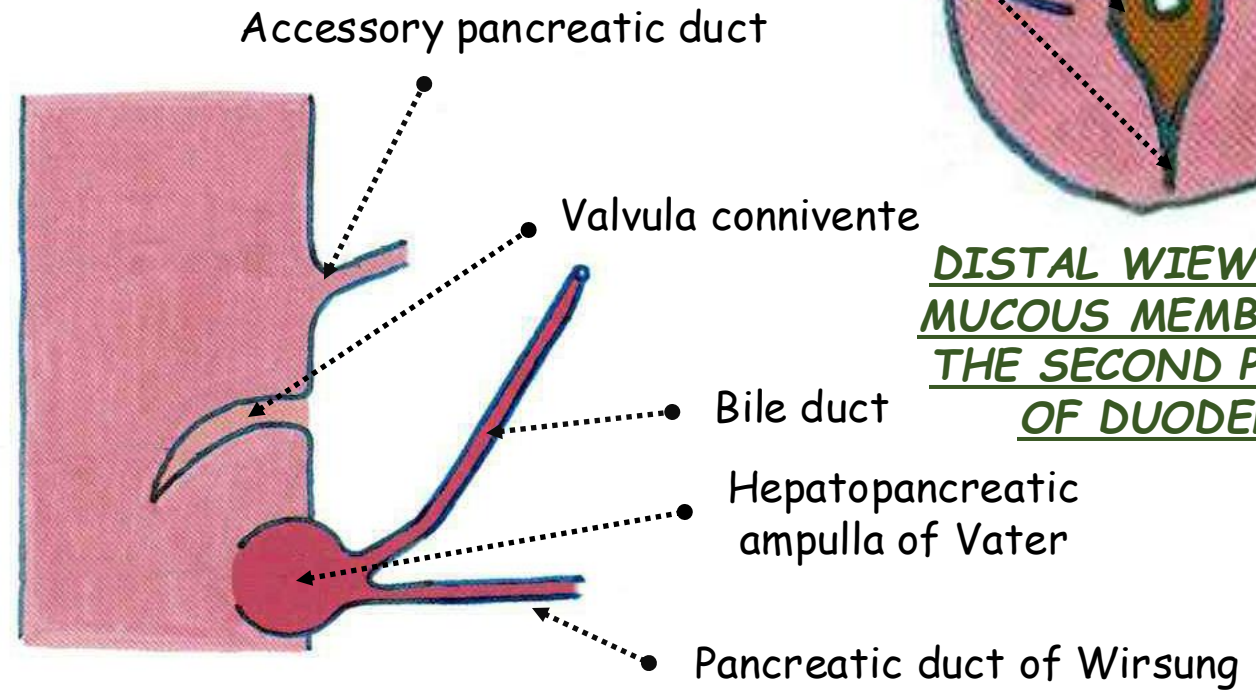


ANTERIOR VIEW OF THE DUODENUM AND PANCREAS

- Posteromedial wall of the second portion: 2 papillae
- **Major duodenal papilla:**
 - Thicker opening of mucosa of the hepatopancreatic ampulla of Vater
 - Halfway along the second part 10 cm from the pylorus
 - Guarded by the semilunar flap of mucous membrane which surmounts it continuous downwards with its frenulum
 - Ampullary sphincter of Oddi
- **Minor duodenal papilla:**
 - 2 cm proximal to the major papilla
 - Small opening of the accessory pancreatic duct of Santorini



DISTAL VIEW OF THE MUCOUS MEMBRANE OF THE SECOND PORTION OF DUODENUM



CORONAL SECTION OF THE SECOND PORTION OF DUODENUM

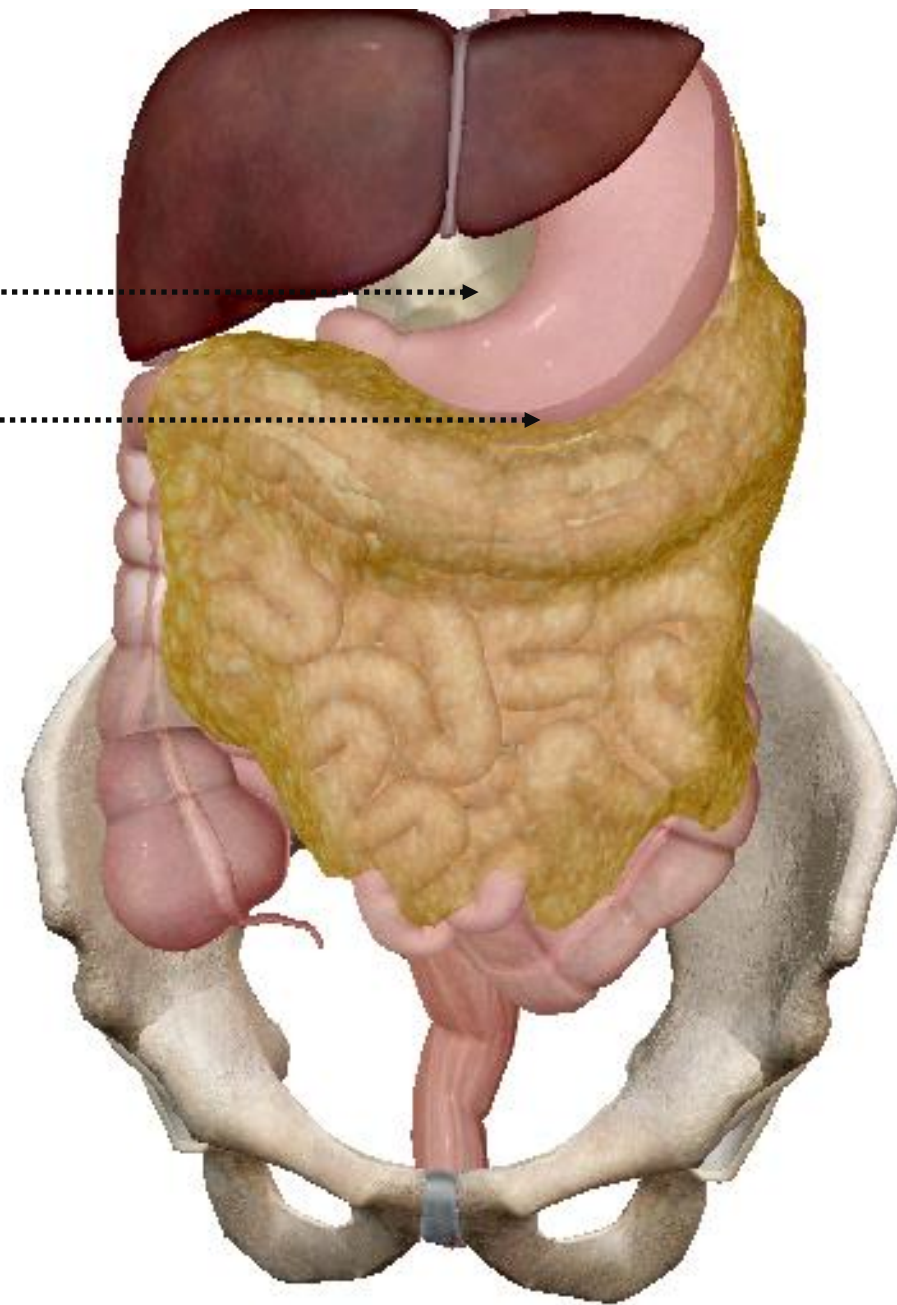
IV. SUPPORTS

A. MOBILE PART

- First 2 cm are contained between the peritoneum of the lesser and greater omenta
- Lesser omentum
- Greater omentum

Lesser omentum

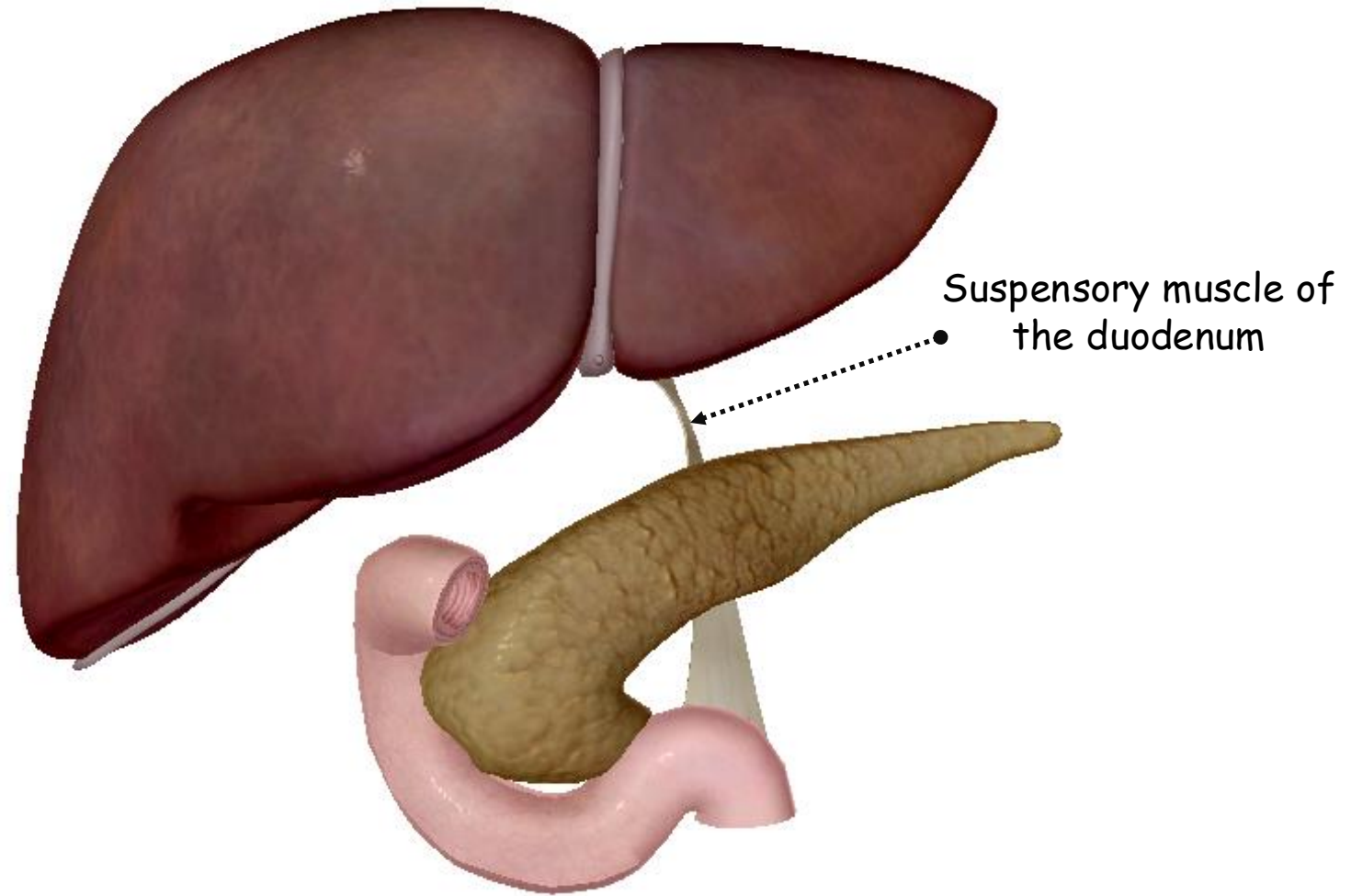
Greater omentum



ANTERIOR VIEW OF THE ABDOMEN

B. FIXED PART

- Most fixed part of the small intestine
- Pancreas
- Bile and pancreatic ducts
- Treitz fascia to the right and left
Toldt's fascia to the left
- Root of the transverse mesocolon and the mesentery
- **Suspensory muscle of the duodenum of Treitz:**
 - Fixes the duodenojejunal flexure to the left psoas fascia
 - Thin band of smooth muscle
 - Ends on the right crus of diaphragm

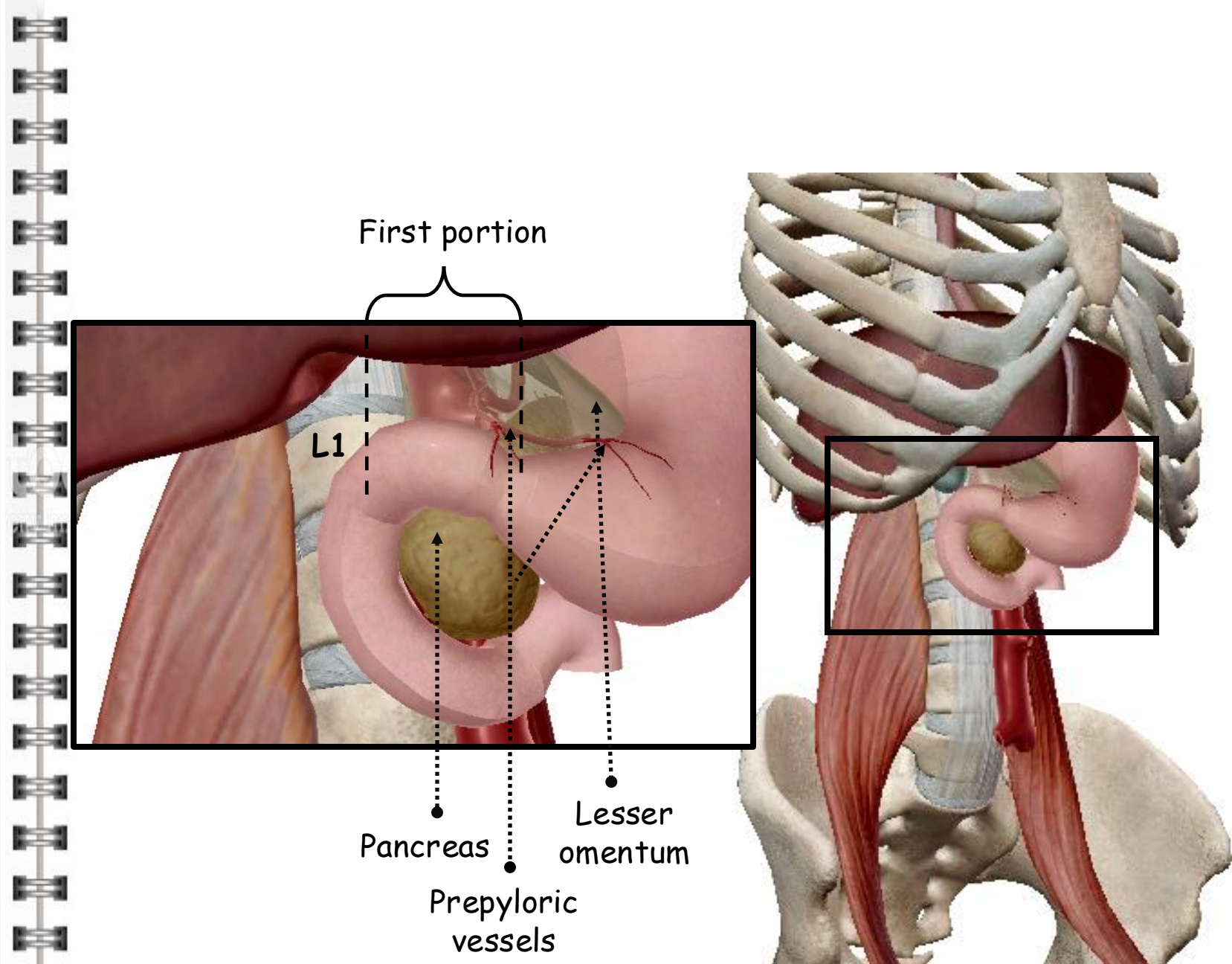


ANTERIOR VIEW OF THE DUODENUM AND PANCREAS

V. ANATOMICAL RELATIONS

A. FIRST PORTION OF THE DUODENUM

- **On top:**
 - Lesser omentum
 - Opening of the lesser sac
 - Prepyloric vein
- **At the bottom:**
 - Upper part of the head of pancreas



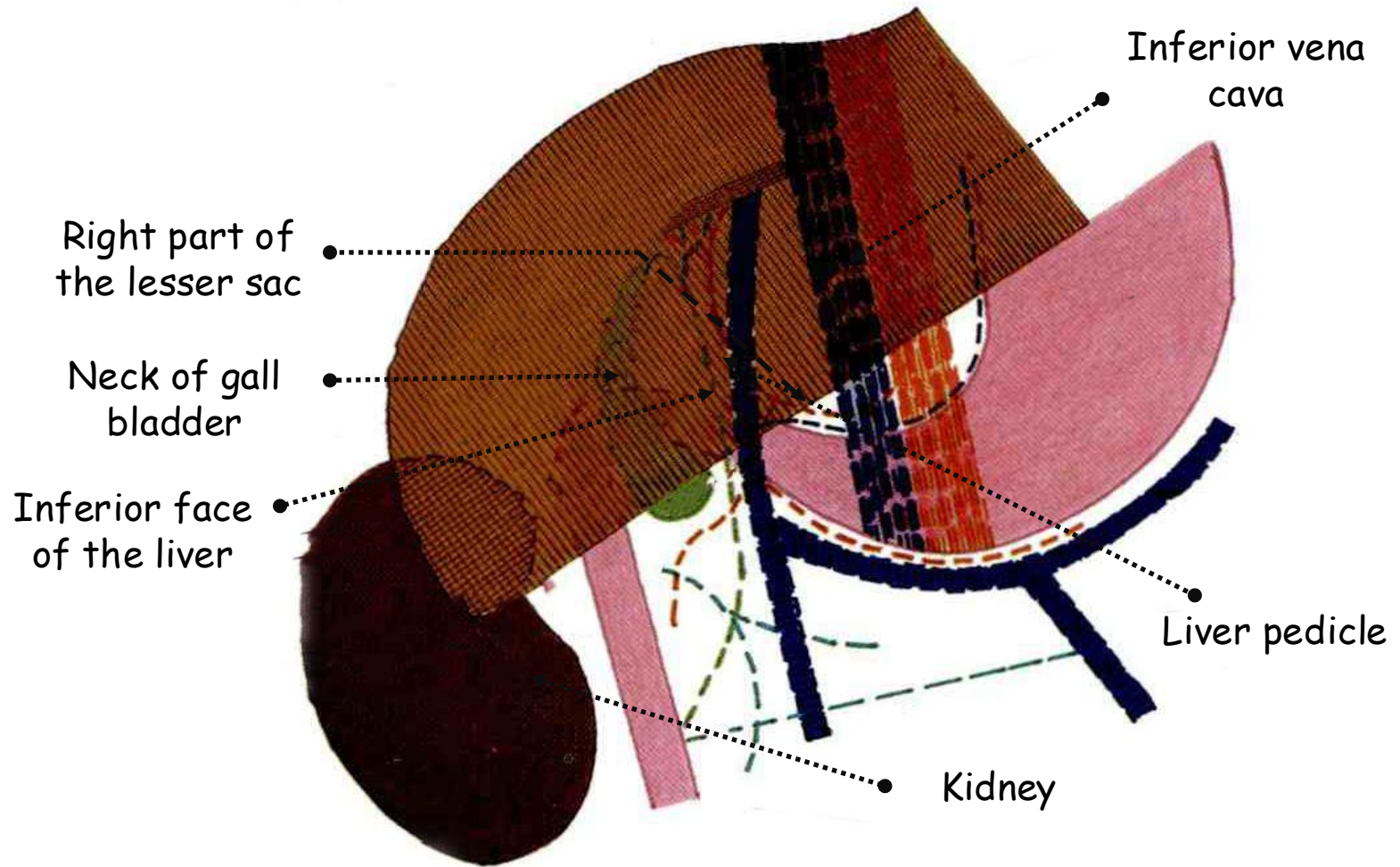
ANTERIOR AND LATERAL VIEW OF THE TRUNK

- **Forwards:**

- Inferior surface of the right lobe of the liver
- Neck of the gall bladder

- **Backwards:**

- Right part of the lesser sac
- Liver pedicle (bile duct, hepatic artery, portal vein)
- Right crus of diaphragm
- Inferior vena cava
- Psoas muscle
- Medial border of the right kidney



ANTERIOR VIEW OF THE FIRST PORTION OF DUODENUM

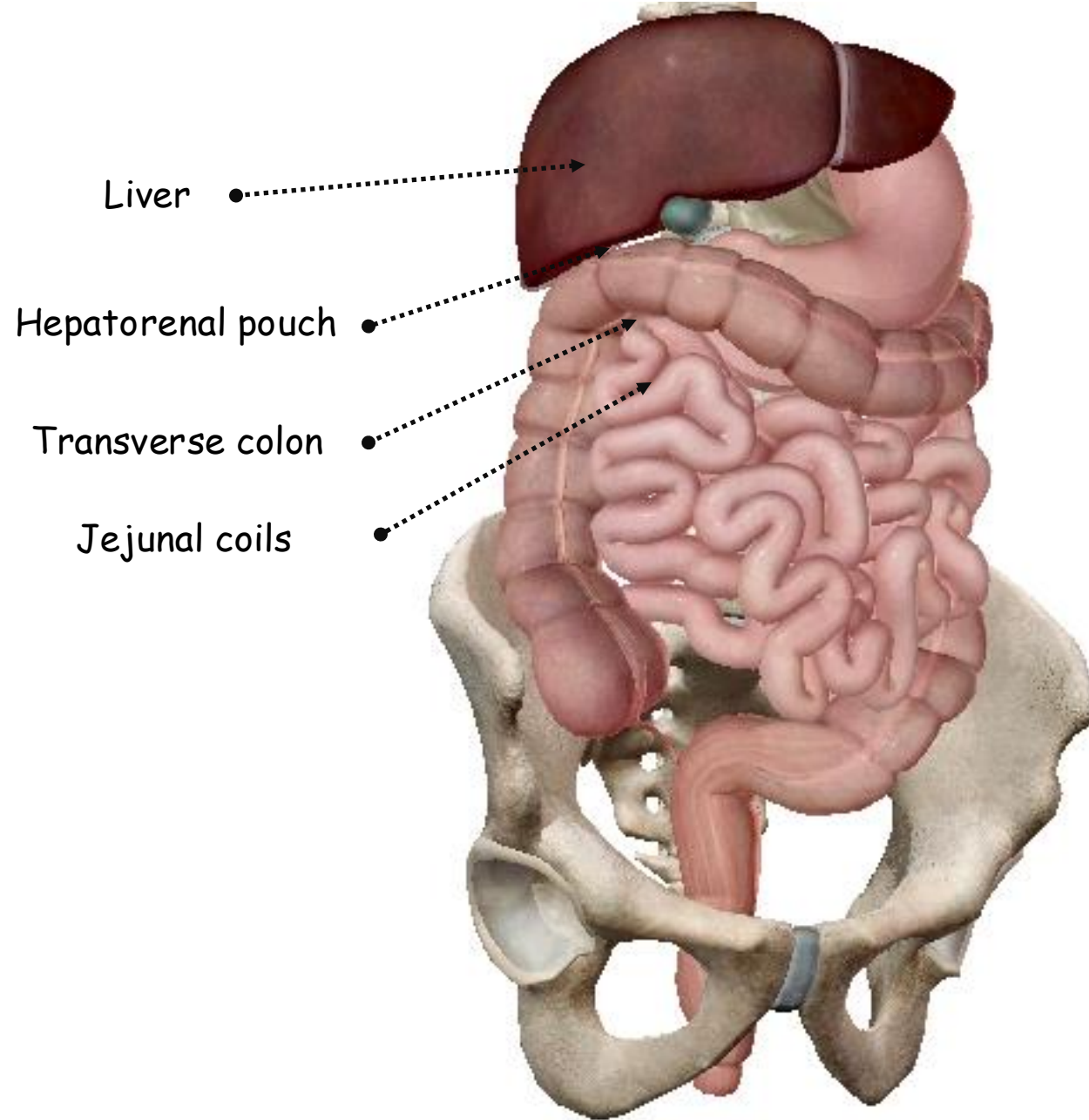
B. SECOND PORTION

- **Forwards:**

- Upper half: hepatorenal pouch and liver

- Towards transverse mesocolon: right part of the transverse colon

- Lower half: jejunal coils



ANTERIOR AND LATERAL VIEW OF THE TRUNK

- **Backwards:**

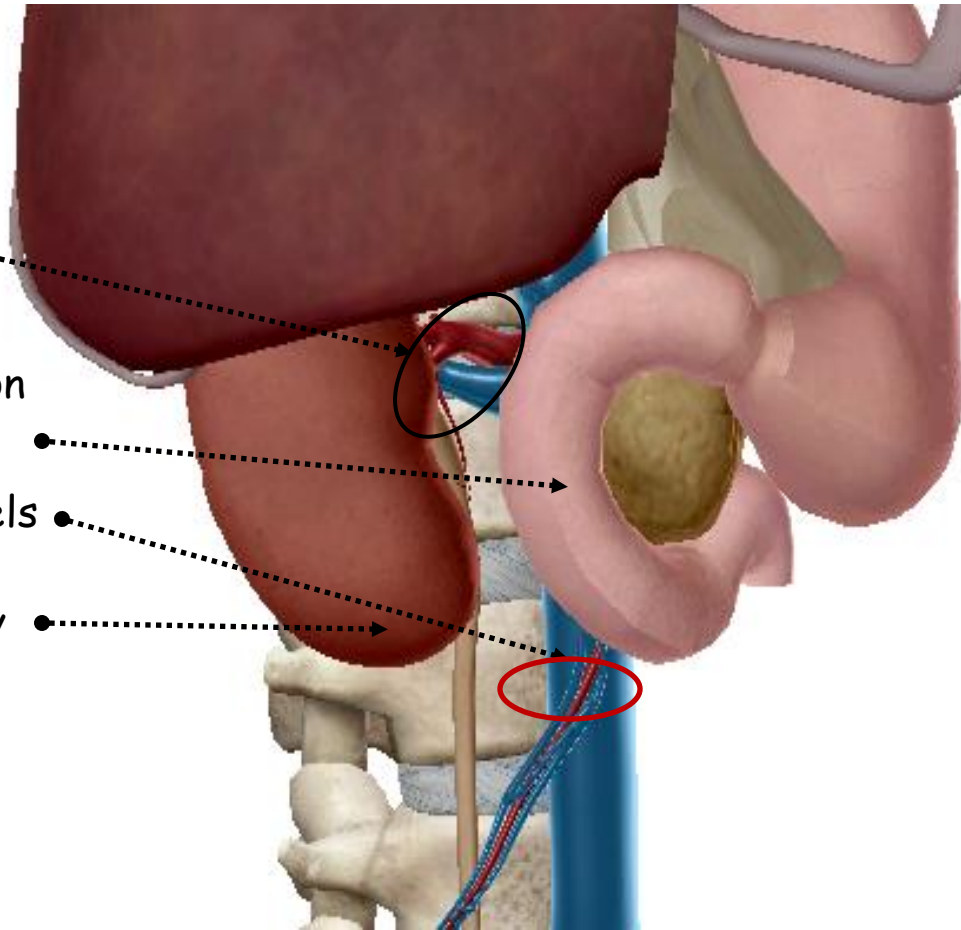
- Hilum of the right kidney
- Right gonadal vessels

Hilum of the
right kidney

Second portion
of duodenum

Gonadal vessels

Right kidney



LATERAL VIEW OF THE DUODENUM

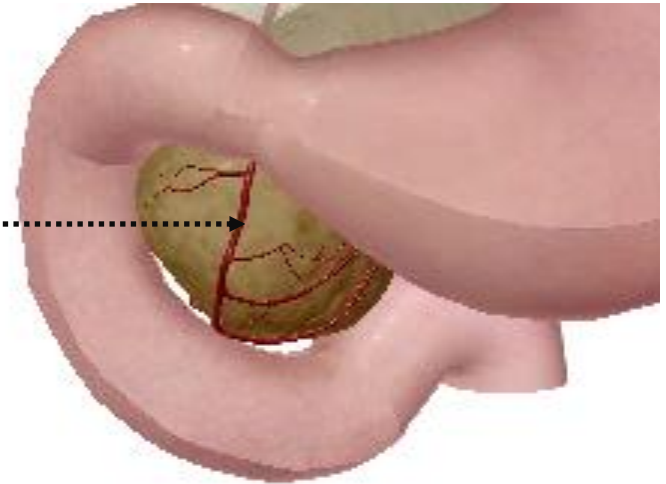
- **Medially:**

- Head of pancreas
- Pancreaticoduodenal vessels

- **Laterally:**

- Medial border of the right kidney

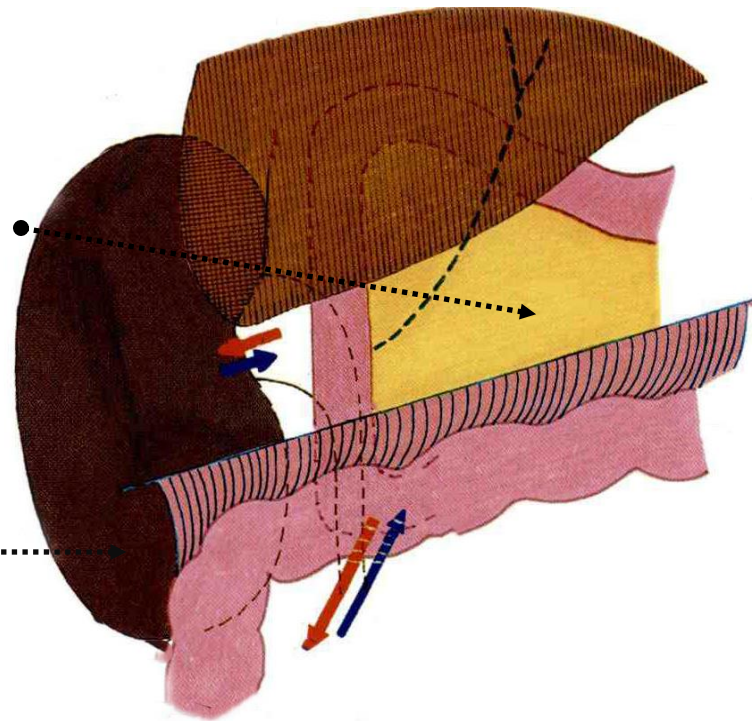
Pancreaticoduodenal vessels



ANTERIOR VIEW OF THE DUODENUM

Head of pancreas

Right kidney



ANTERIOR VIEW OF THE DUODENUM AND PANCREAS

C. THIRD PORTION

- **Forwards:**

- Superior mesenteric vessels
- Commencement of mesentery
- Coils of jejunum

- **Backwards:**

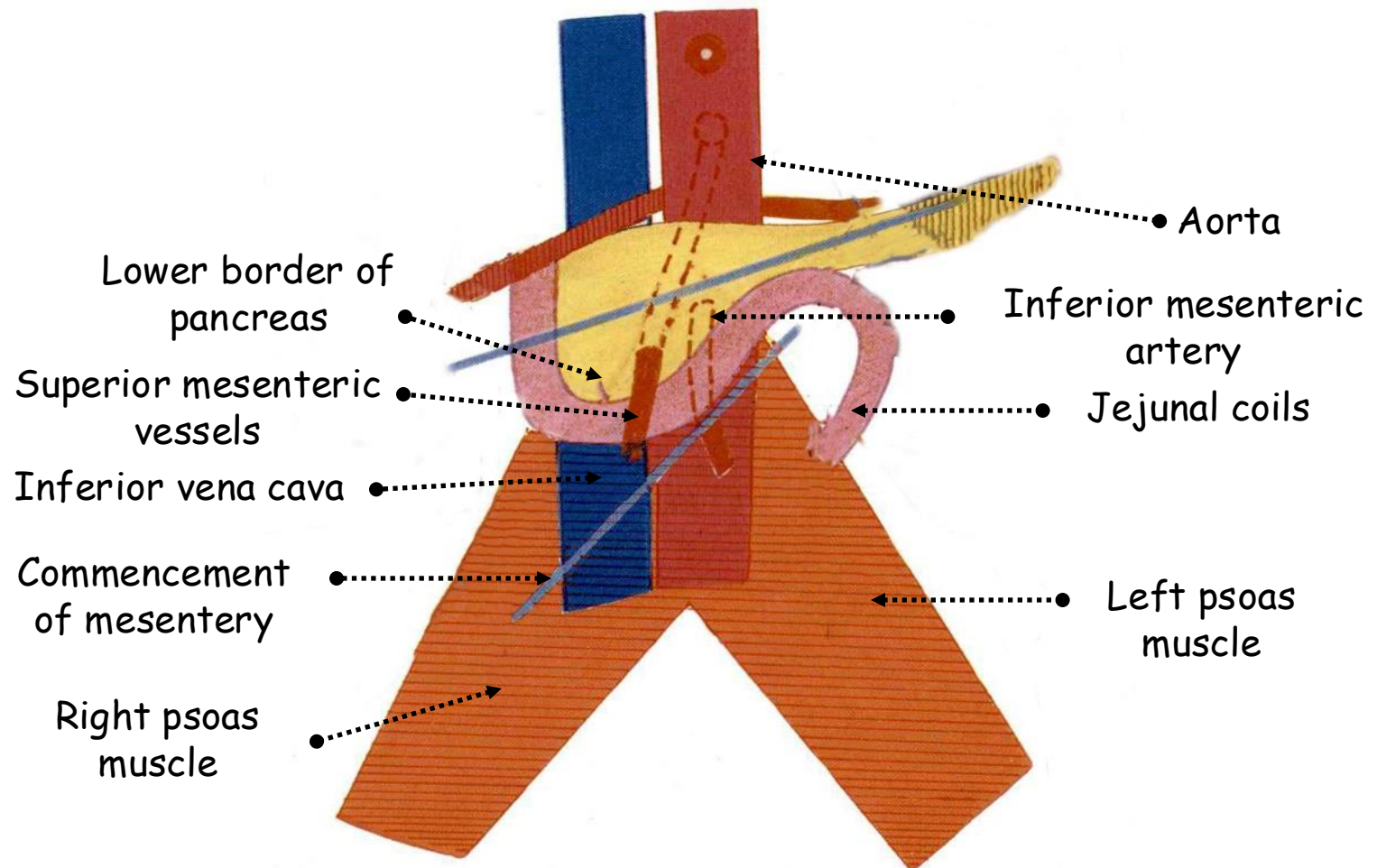
- Right psoas muscle
- Gonadal vessels
- Right ureter
- Inferior vena cava
- Aorta at the commencement of the inferior mesenteric artery
- Left psoas muscle

- **On top:**

- Lower border of pancreas

- **At the bottom:**

- Coils of jejunum



ANTERIOR VIEW OF THE DUODENUM AND PANCREAS

D. FOURTH PORTION

- **Forwards:**

- Superior mesenteric vessels
- Root of transverse mesocolon
- Peritoneal floor of infracolic compartment
- Coils of jejunum

- **Backwards:**

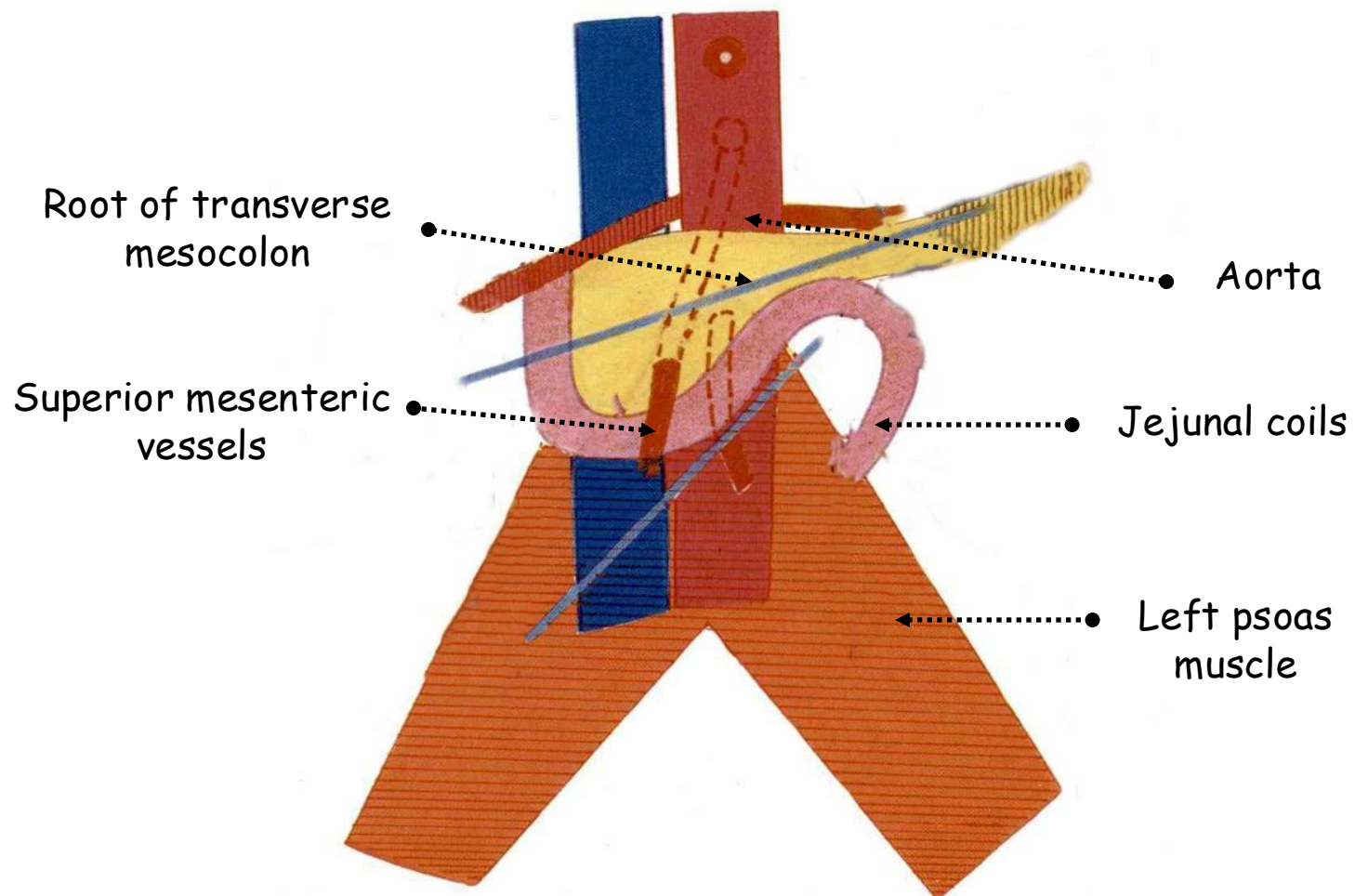
- Left psoas muscle
- Left sympathetic trunk

- **Medially:**

- Aorta

- **Laterally:**

- Coils of jejunum



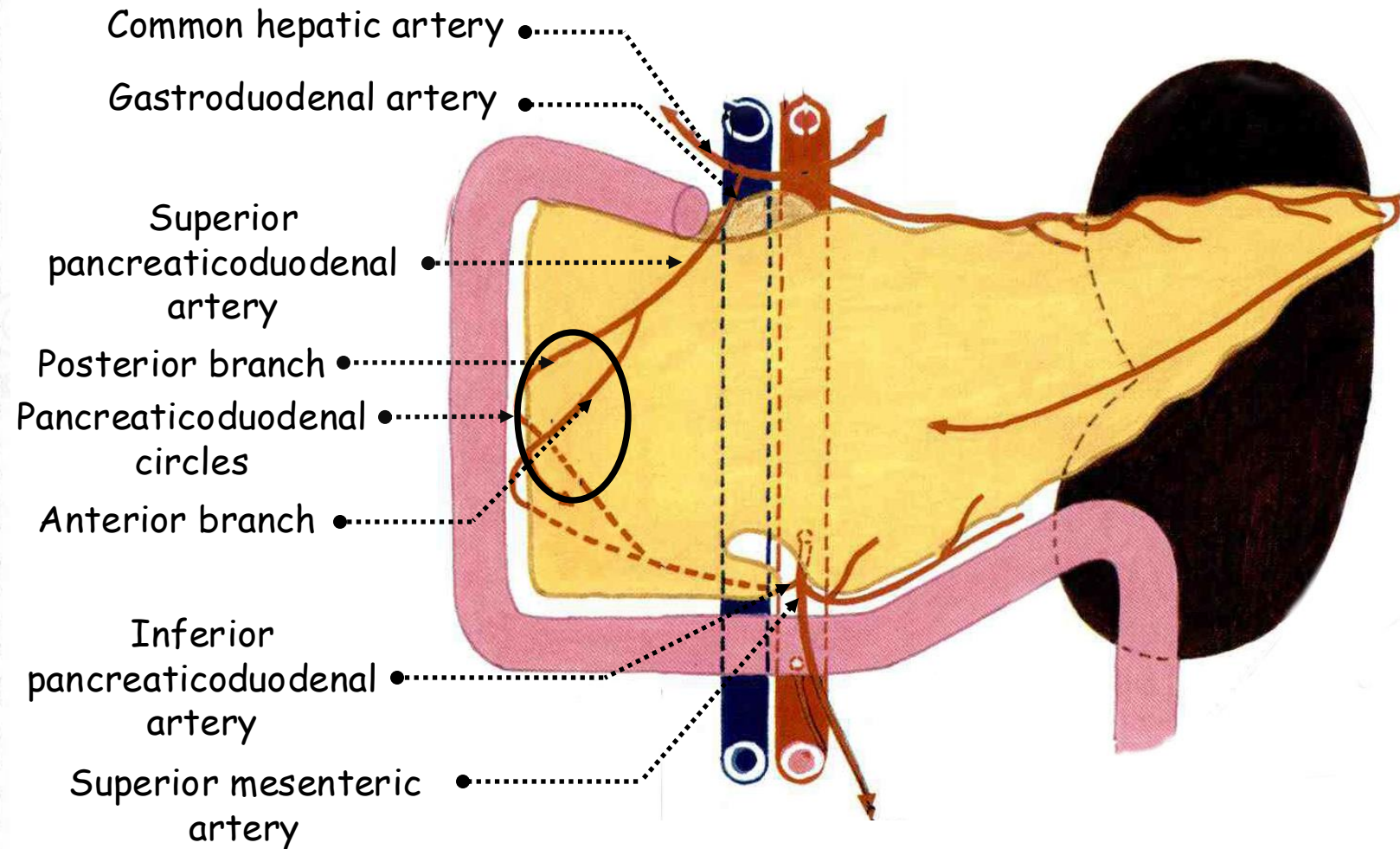
ANTERIOR VIEW OF THE DUODENUM AND PANCREAS

VI. BLOOD SUPPLY; LYMPH DRAINAGE AND NERVE SUPPLY

A. ARTERIES

1. Pancreaticoduodenal arteries:

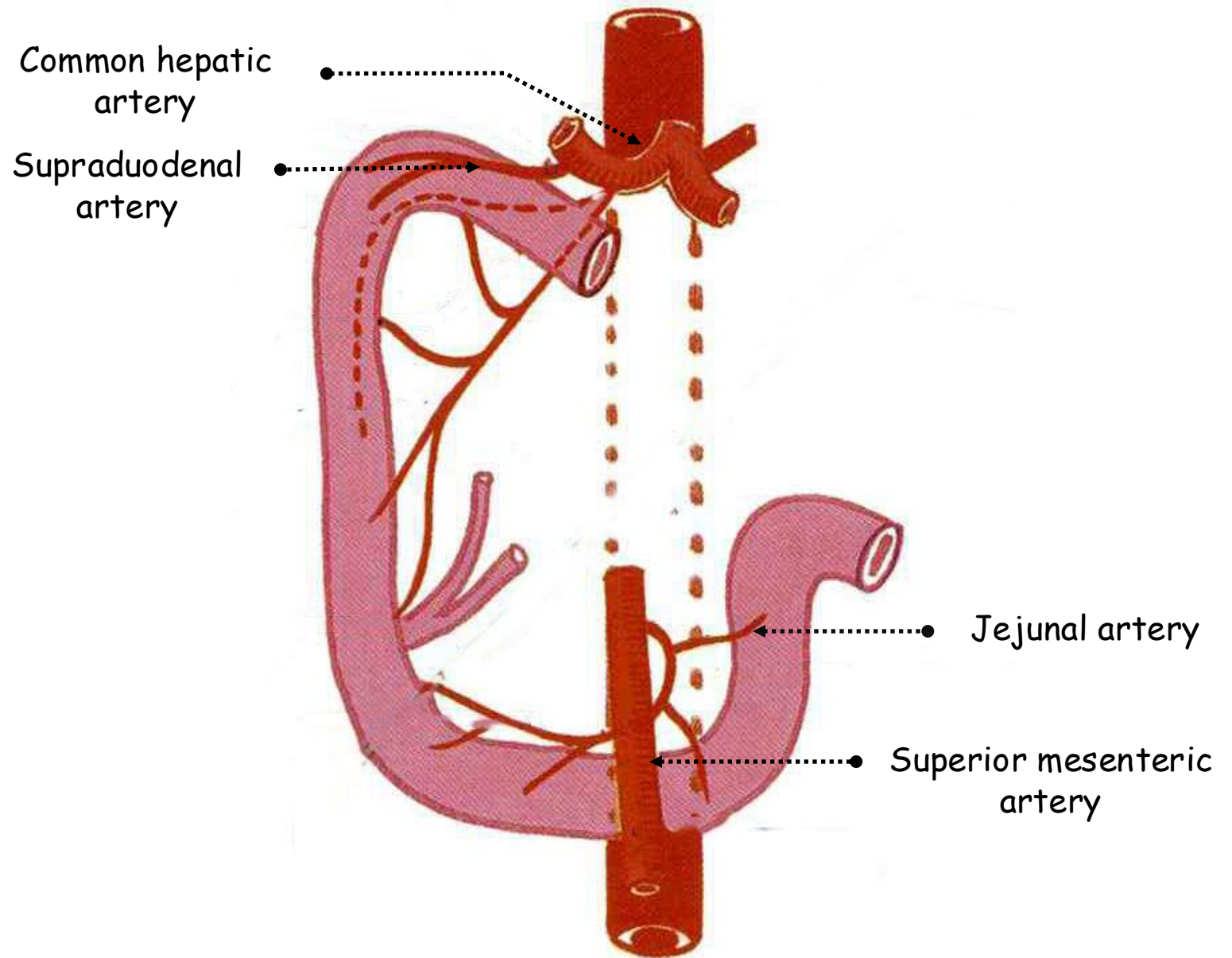
- **Superior:**
 - Branch of the gastroduodenal artery
 - Two terminal branches: anterior and posterior
- **Inferior:**
 - Branch of the superior mesenteric artery
 - Two terminal branches: anterior and posterior
- **Pancreaticoduodenal circles:**
 - Anterior and posterior
 - Homonymous branches of the superior and inferior pancreaticoduodenal arteries
- Except the first portion and the duodenojejunal junction



ANTERIOR VIEW OF THE DUODENUM AND PANCREAS

2. Gastrooduodenal artery:
- Terminal branch of the common hepatic artery
 - Passes down behind the first part of the duodenum, to the left of the portal vein, and divides into two
 - Supraduodenal branches
 - Retroduodenal branches
 - Infraduodenal branches
 - Duodenal cap

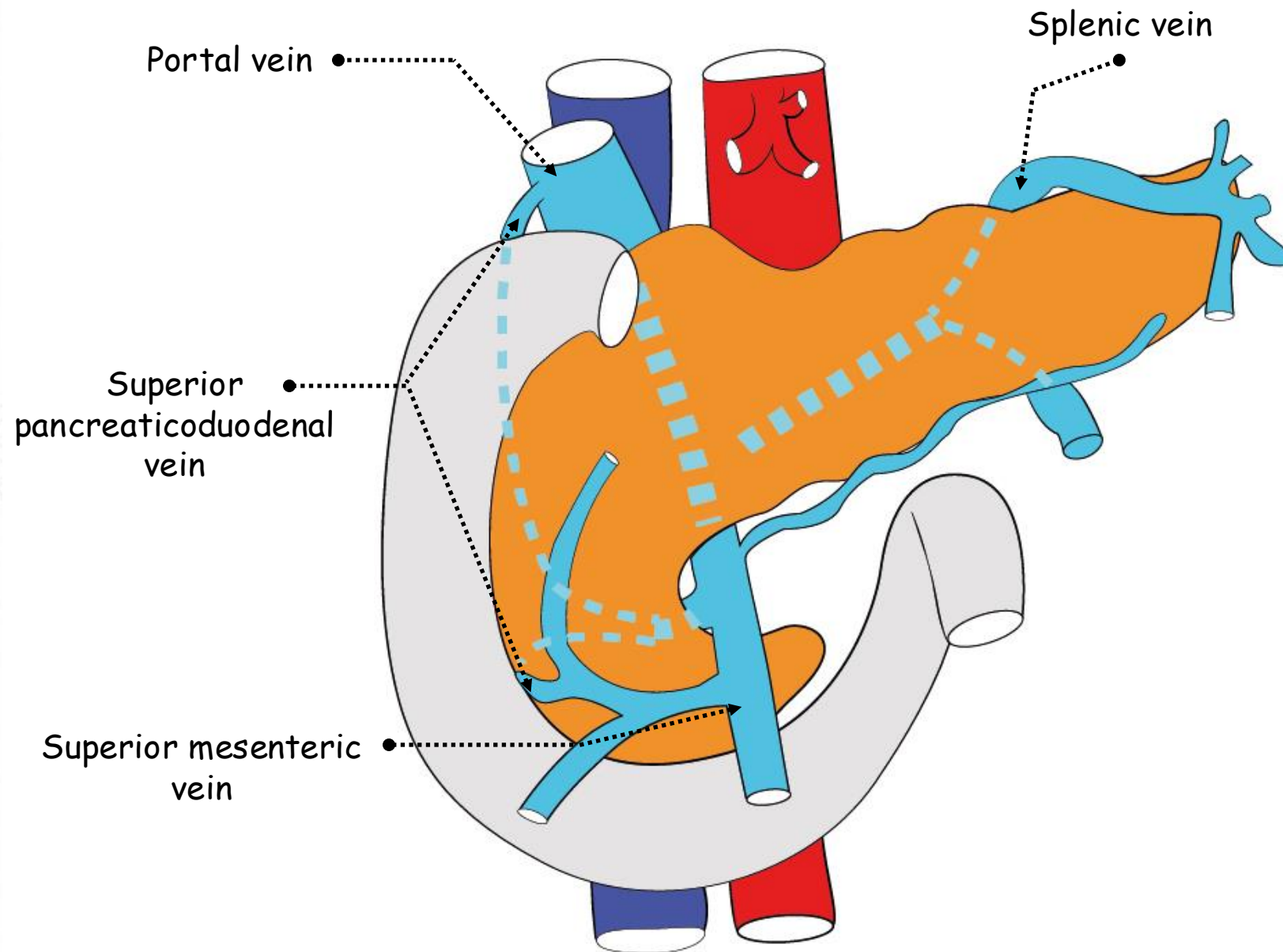
3. Superior mesenteric artery:
- Jejunal branches
 - Duodenojejunal junction



ANTERIOR VIEW OF THE DUODENUM SHOWING ITS ARTERIES

B. VEINS

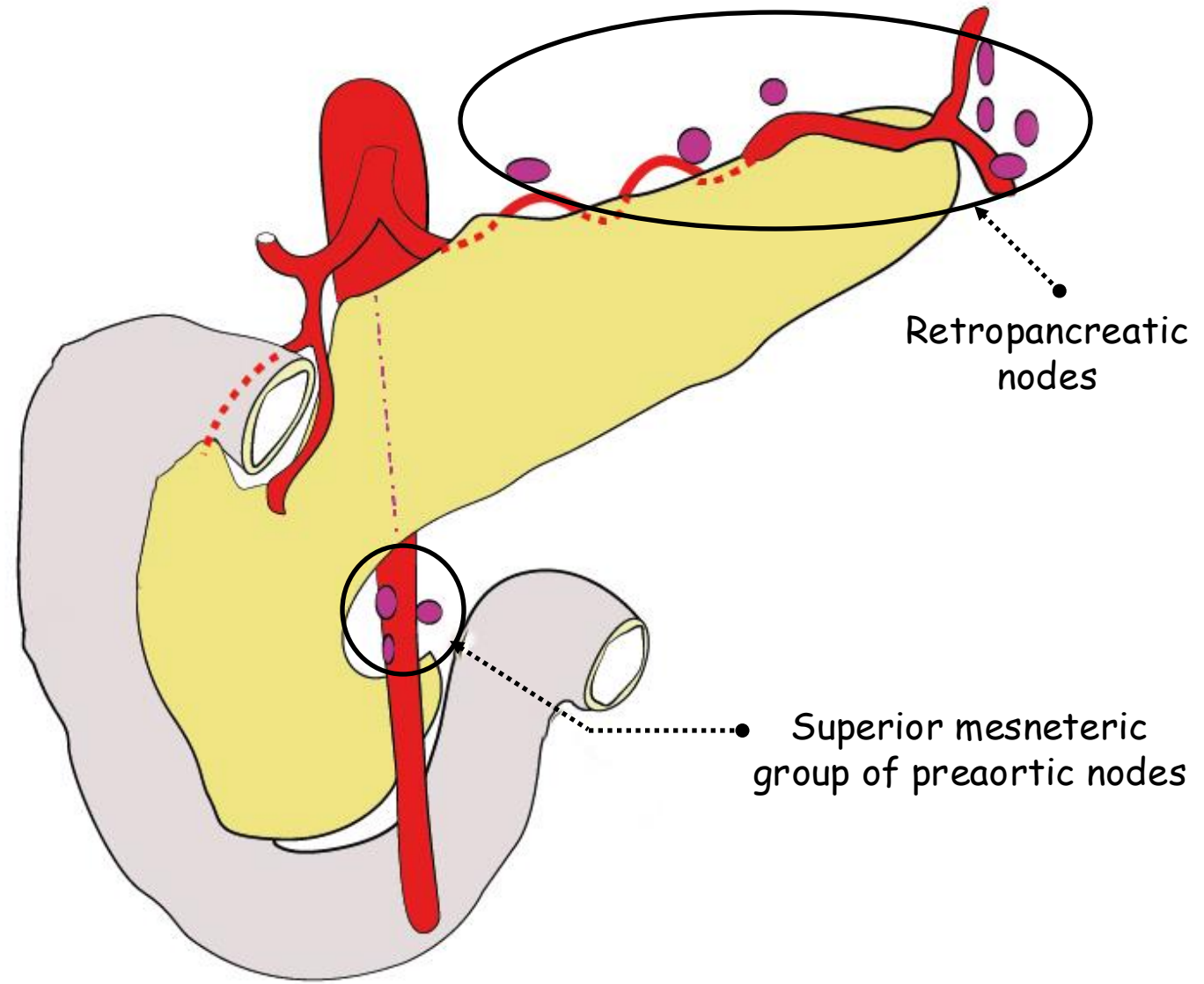
- Correspond to the arteries
- Superior pancreaticoduodenal vein drains into the portal vein
- Inferior pancreaticoduodenal vein drains into the superior mesenteric vein through the right gastro-epiploic artery
- Small veins directly into the portal vein



ANTERIOR VIEW OF THE DUODENUM AND PANCREAS

C. LYMPH DRAINAGE

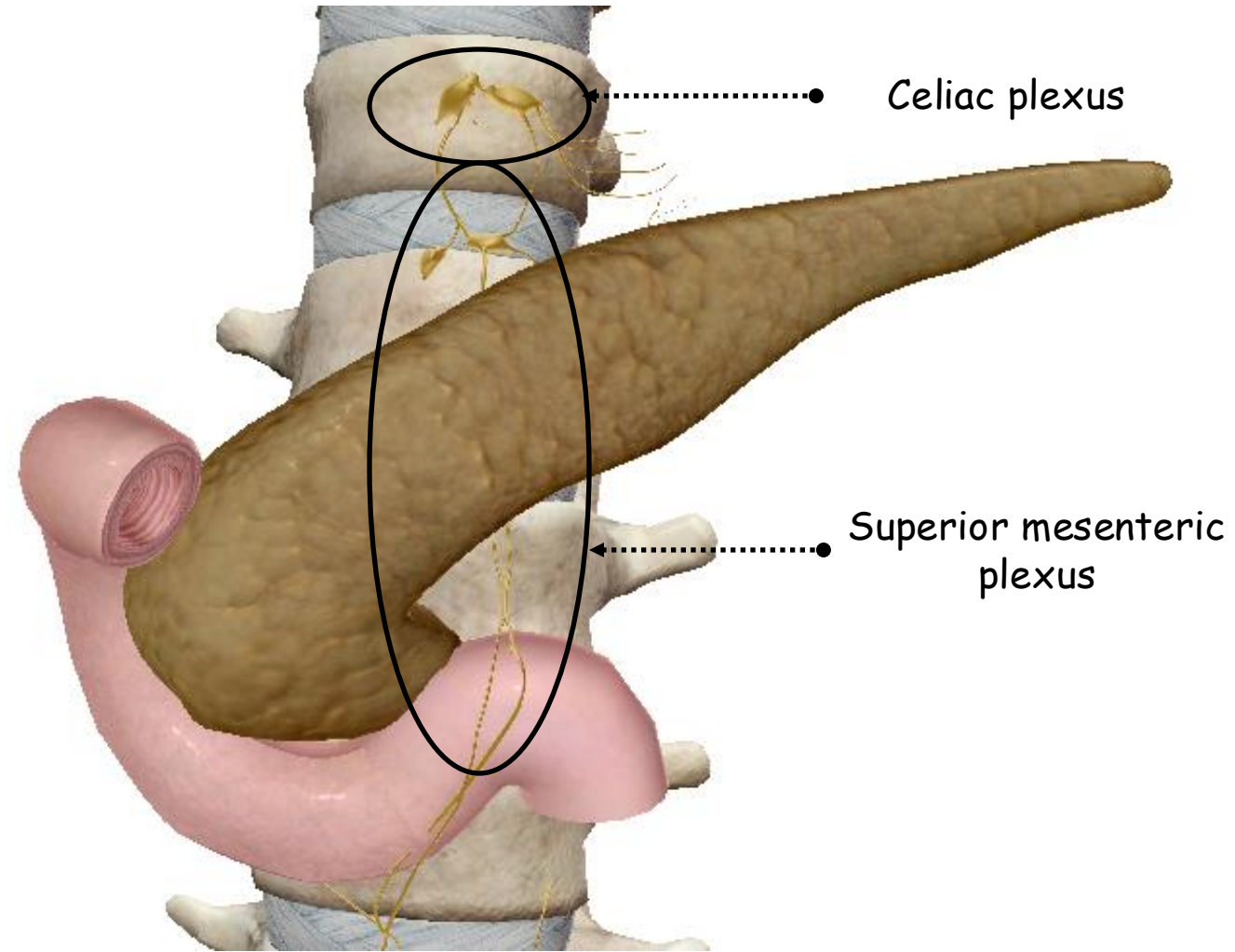
- Follow the course of the arteries
- **Retropancreatic nodes:** second, third and fourth portions
- **Suprapyloric and retropyloric nodes:** duodenal cap
- Flow into superior mesenteric and celiac groups of preaortic nodes



ANTERIOR VIEW OF THE DUODENUM AND PANCREAS

D. NERVES

- **Parasympathetic:**
 - Posterior vagal trunk and celiac plexus
- **Sympathetic:**
 - Spinal cord segments T6-10 via splanchnic nerves and the celiac plexus



ANTERIOR VIEW OF THE DUODENUM AND PANCREAS

VII. CONCLUSION

- Initial fixed portion of the small intestine
- Retroperitoneal, intraperitoneal, supracolic and infracolic
- Several peritoneal, vascular and visceral relations
- Rich blood supply
- Lymph drainage is ensured mainly by the preaortic nodes





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