Anatomy & Embryology - GIS

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The last part of Video #7

3rd & Final Part of lecture #5

To be Continued in Lecture #7

Some info were taken from 018 Sheet. Thanks to Rama Al-Abbady ♥

The small intestine

The small intestine is made up of 3 parts :

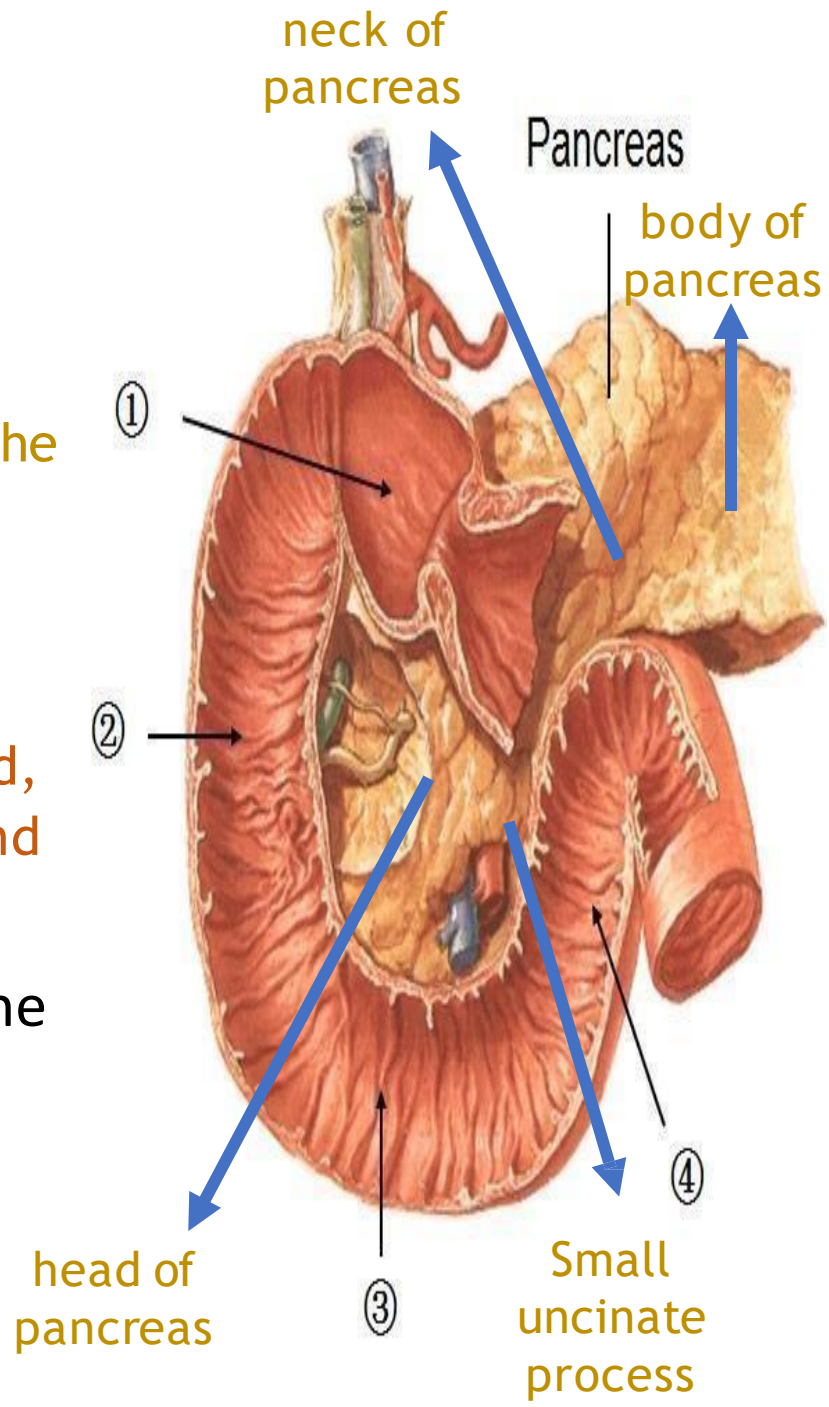
- The duodenum which is 25cm/10 inches and is retroperitoneal except the first and last inches.
- The jejunum and ileum which are 6 meters long and are intraperitoneal (they have a mesentery).

We can sometimes say that the small intestine is 6 meters long (this includes all 3 parts) but with taking into consideration the differences between these 3 parts

DOUDENUM

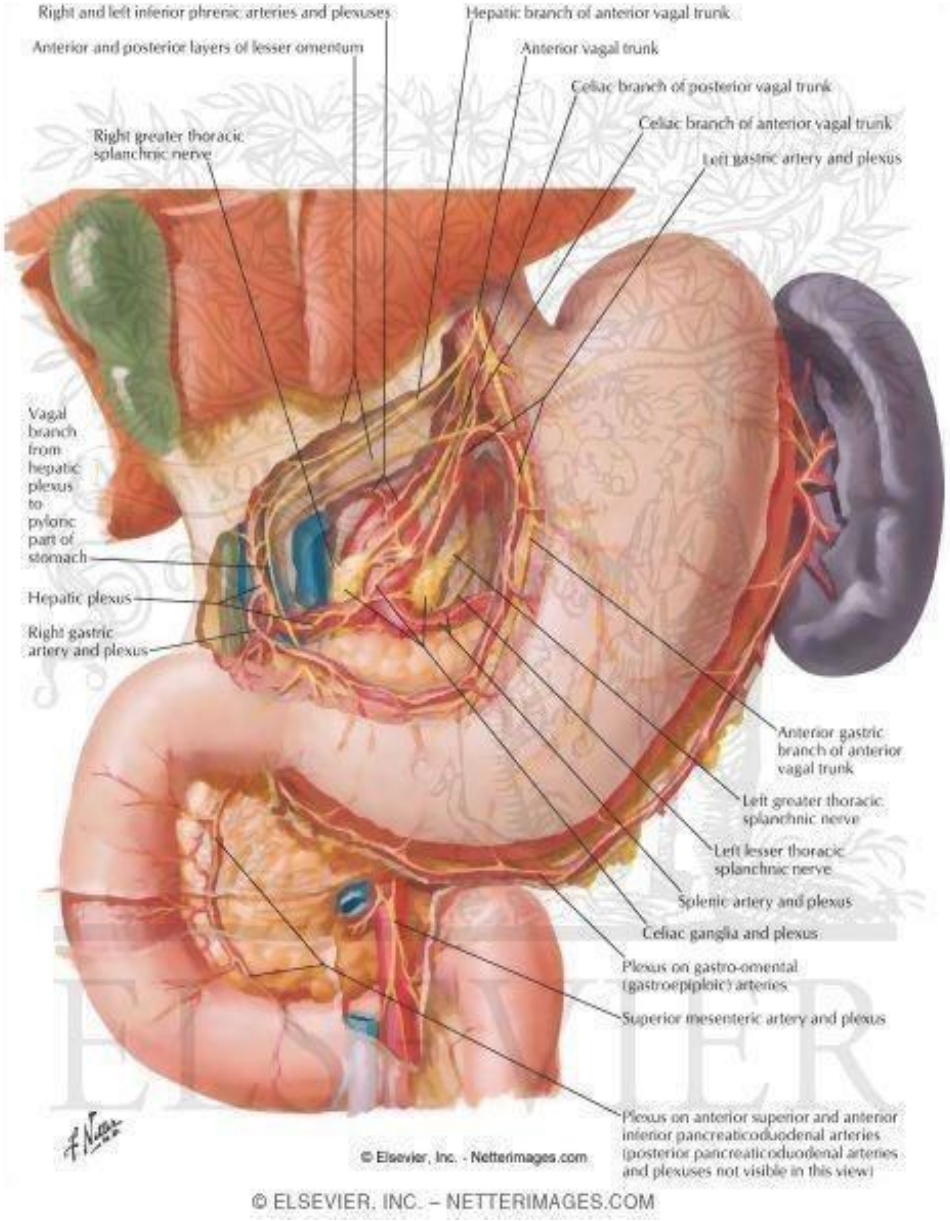
duodenum

- The duodenum is ac-shaped
- Concave tube.
- About 10” in length.
- It has four parts, the 1st is 2 inches, the 2nd is 3 inches (vertical) , the 3rd is 4 inches (horizontal) & the 4th is 1 inch.
- It joins the stomach to the jejunum.
- It curves around the head of the pancreas to the left and backwards. Notice the location of the uncinate process of the head, left to the 4th part of duodenum. The superior mesenteric artery and veins pass in front of this process.
- It is important because it (2nd part) receives the opening of the common bile and pancreatic ducts. they secrete substances to help in the digestion of fat which occurs in the duodenum.



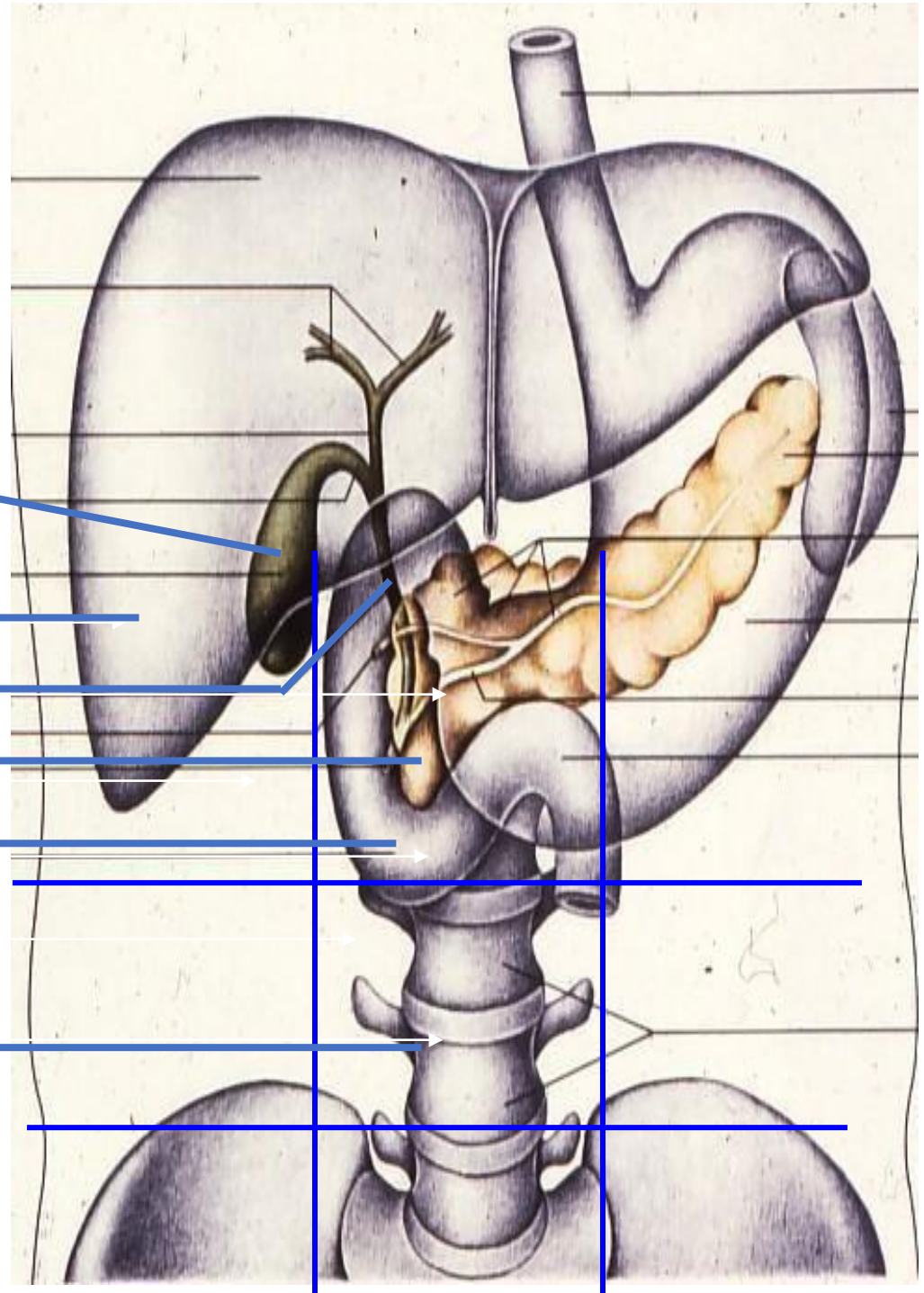
duodenum….cont

- Most of the duodenum is retroperitoneal except the 1st & last inches (they are intraperitoneal , (1st inch) ❼ because the greater & lesser omentum are attached to the 1st part of the duodenum | (last inch) ❼ completes as jejunum).
- This short segment (1st inch) has the lesser omentum on its upper border, the greater omentum on its lower border & the lesser sac posterior to it.
- The duodenum extends from the pylorus to the jejunum (it begins at the pyloric sphincter (stomach) and ends at the ligament of Treitz which continues as the jejunum) .
- It is divided into 4 parts.



Site of duodenum

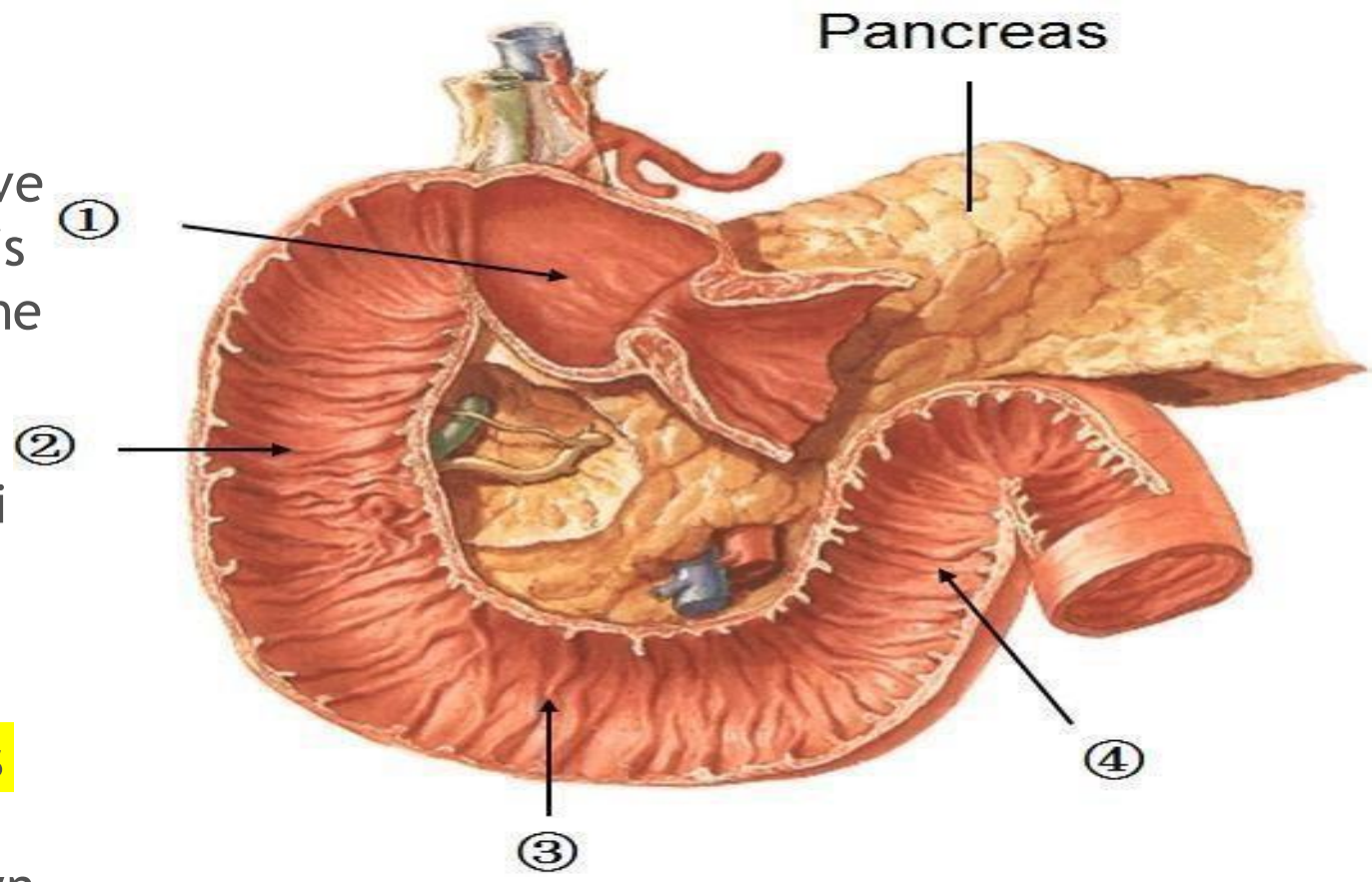
- The duodenum is situated in the **epigastric & umbilical regions**
- For purposes of description, is divided into four parts



- The portal vein forms behind the neck of pancreas from the splenic and superior mesenteric veins and continues to the liver. All absorptive material of the
- GI tract reaches the liver through these portal veins.

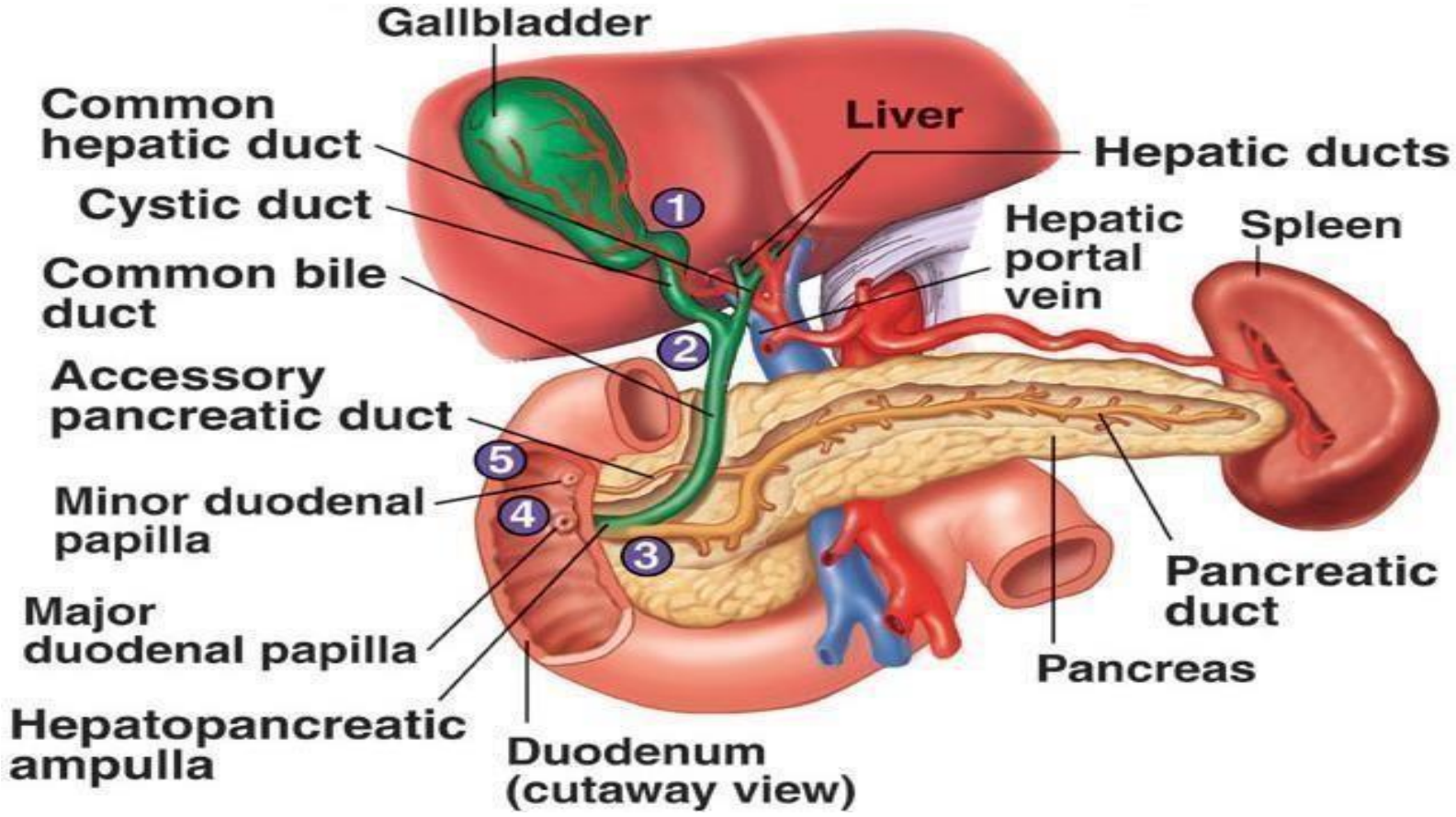
Parts of the duodenum & Theirrelations

- The common bile & the pancreatic ducts have the same opening in the duodenum. So, this means that their meeting forms a bulge in the duodenal wall called ampulla of Vater.
- Around this ampulla is the sphincter of Oddi (a smooth muscle).
- This opening on the inside is known as the major duodenal papilla . Sometimes there is another opening 1 inch above the major papilla for accessory pancreatic ducts known as the minor duodenal papilla.



Parts of the duodenum &Theirrelations

- The liver has left and right lobes .
- The left and right hepatic ducts form the common hepatic duct
- It meets with the cystic duct of the gallbladder to form the common bile duct .



You're about to read a bit of histology , so bare with me

- The GI track has 4 layers (mucosa, submucosa, muscular layer and adventitia or serosa).
- The folds on the inside of the duodenum are called plicae circulares.
- The lining epithelium of the duodenum (mucosa) is simple columnar epithelium with goblet cells.
- In the submucosa of duodenum there are glands known as Brunner's glands which produce the alkaline secretion that neutralizes the acidity of the chyme when it comes from the stomach.
- Note: in the entirety of the GI track only 2 organs have glands in their submucosa, and they are the oesophagus and duodenum.
- In the mucosa of the duodenum there is lamina propria which also contains glands called crypts of Lieberkühn.
- The lamina propria is a thin layer of loose (areolar) connective tissue, which lies beneath the epithelium, and together with the epithelium and basement membrane constitutes the mucosa, from the web.

A New Technique ERCP (Endoscopic retrograde cholangiopancreatography)

- This is a new technique where an endoscope is placed through the mouth and proceeds retrogradely through the pharynx, oesophagus, stomach and duodenum . then you find the major duodenal papilla and you cut the sphincter of Oddi entering either the pancreatic or common bile ducts based on what you want to do.

- This technique is used in the treatment of stones that form in the common bile duct and block it thus causing jaundice (yellow sclera, yellow and itchy skin) which used to be treated with surgery in the past. Nowadays , when you find the stone with the endoscope you use a basket and remove the stone leaving it in the duodenum & it gets out with the stool.

- Sometimes stasis of the secretion of pancreas happens and it becomes like mud or forms stones and closes the pancreatic duct , this may cause pancreatitis which is very dangerous, and it is treated with ERCP, by entering the duct with the endoscope and adding saline which will dissolve thestones.

1st part of Duodenum

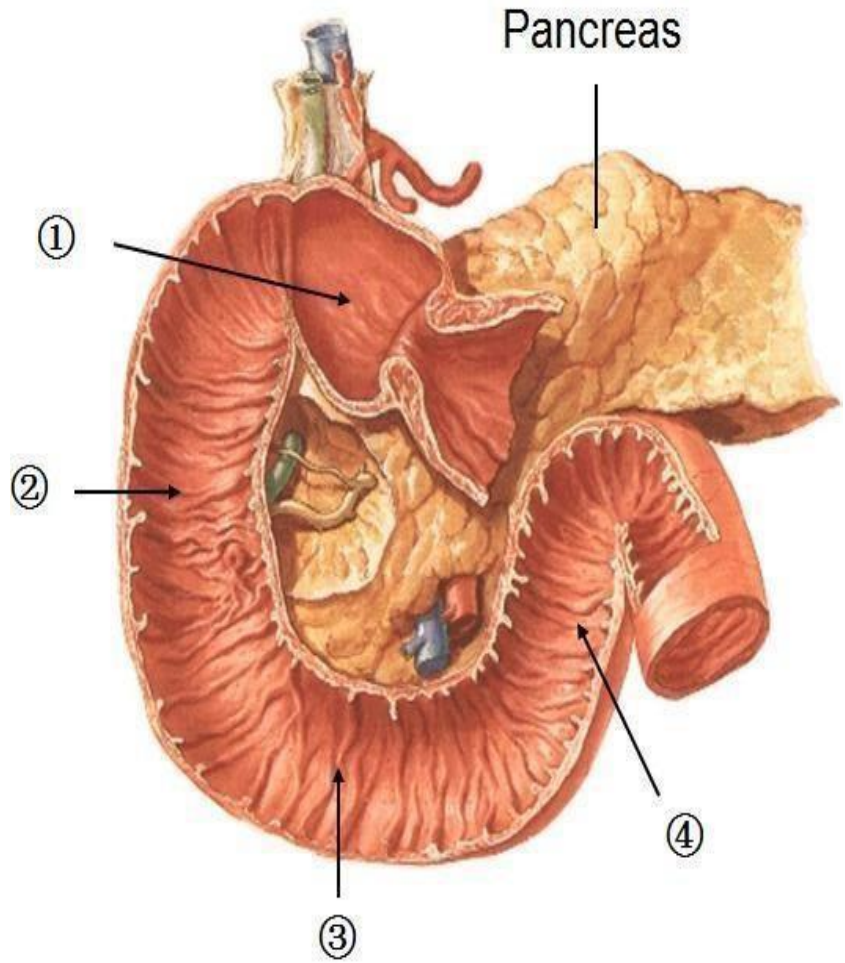
- The first part is 2 inches long & it's divided into 2 parts :

• The 1st inch (intraperitoneal)

- it's a common site for peptic or duodenal ulcers.
- Duodenal ulcers are more common than gastric ulcers and happen because the chyme that comes from the stomach is acidic (the duodenal secretions are alkaline and work to neutralize that acidity, but ulcers could still happen if the acidity was too high) . The posterior wall of duodenum is affected the most.

• The 2nd inch (retroperitoneal)

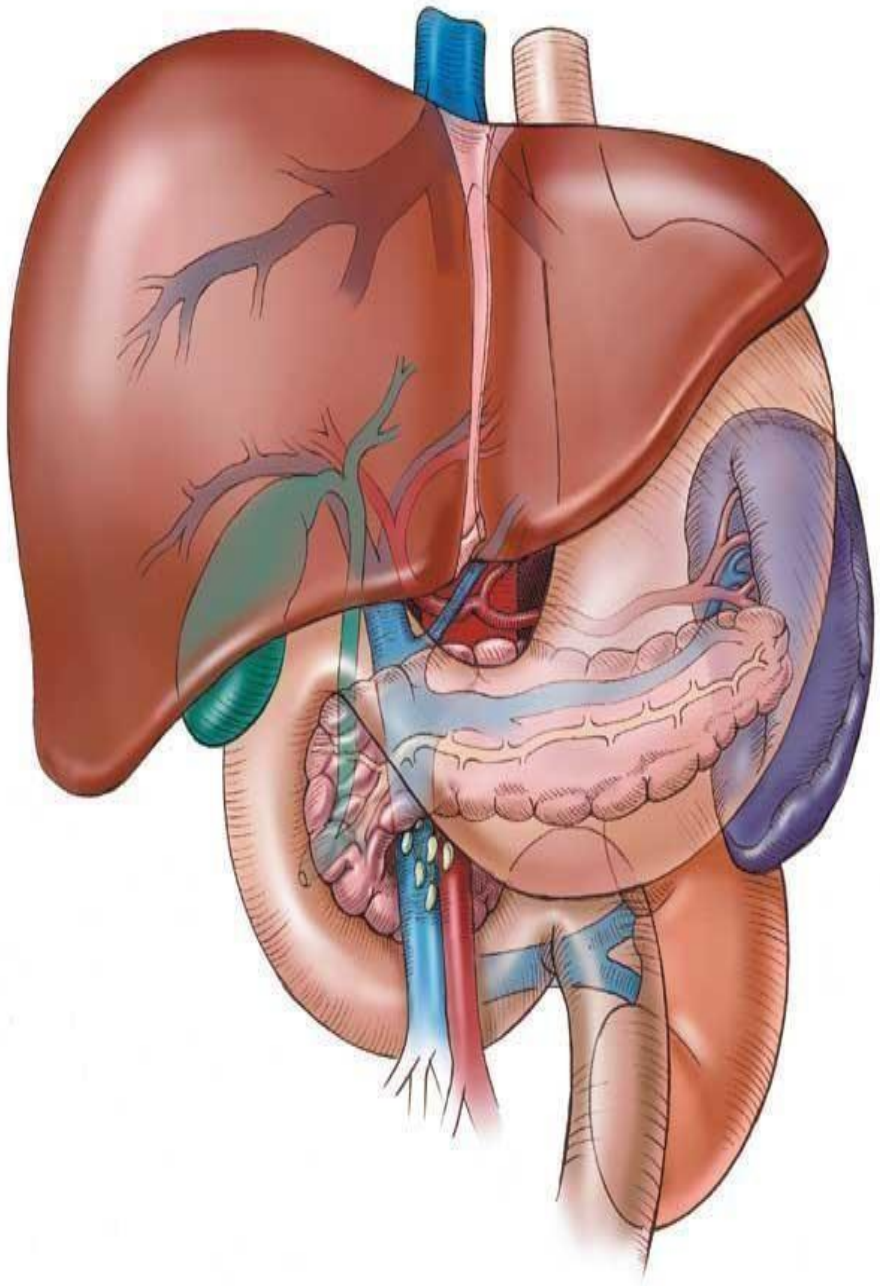
- It begins from the pyloduodenal junction
- At the level of the transpyloric line
- Runs upward and backward at the level of the 1st lumbar vertebra 1 inch to the right.
- It reaches the neck of the gall bladder .



Relations of 1st part of doudenum

Ant.

- The liver (quadratus lobe)
- gall bladder

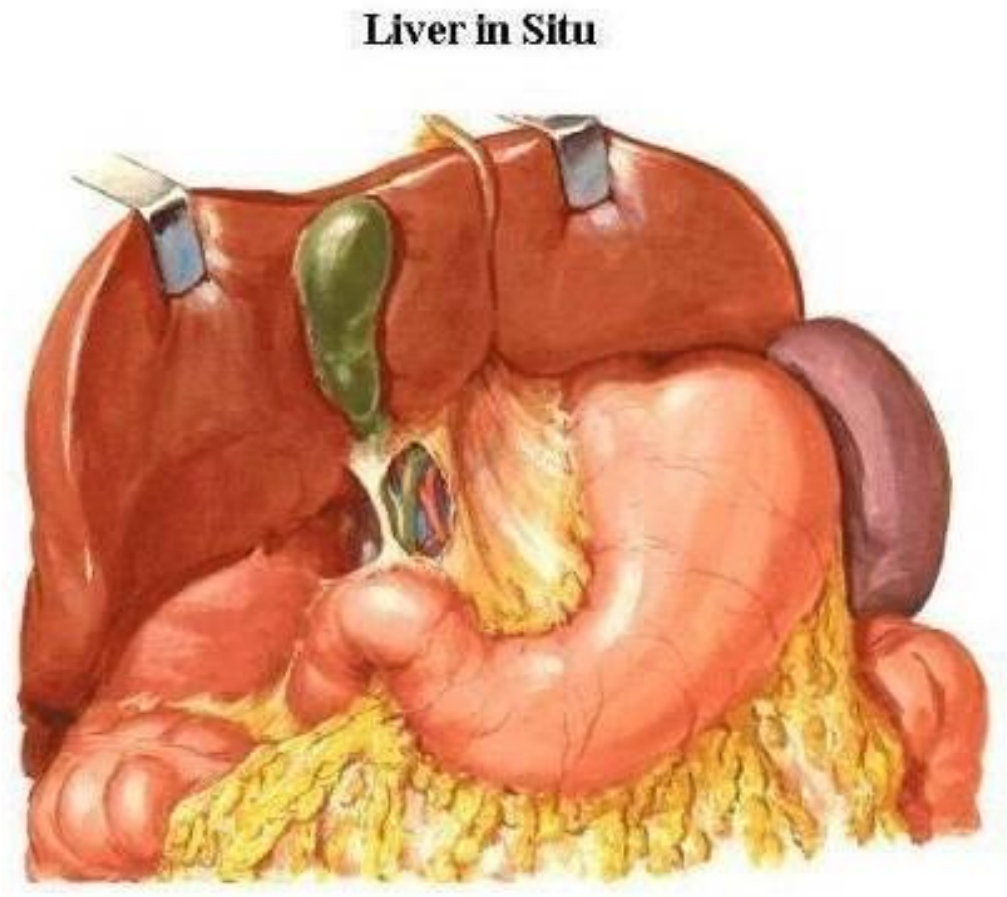


Relations of 1st part of duodenum……cont

Sup.

- the epiploic foramen (anterior to this foramen is a free edge of lesser omentum containing three structures:

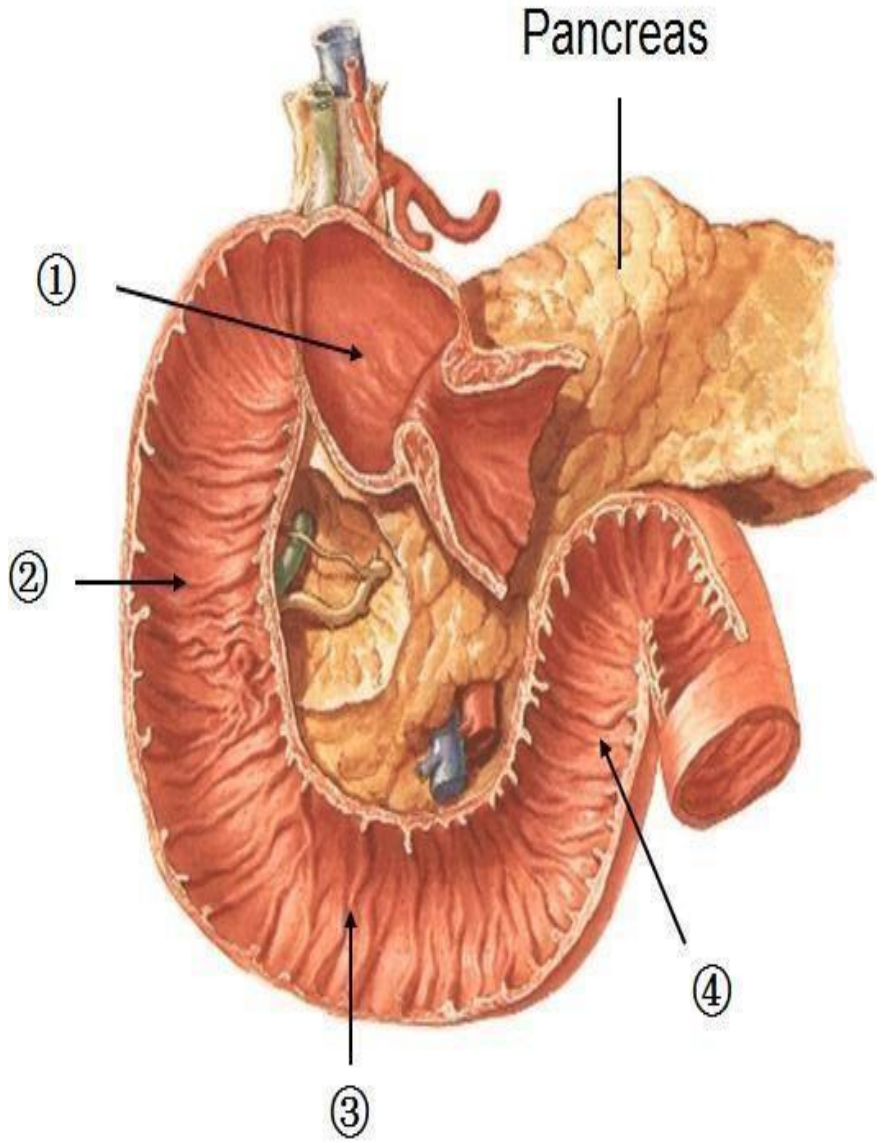
1. the common pyloric duct
2. the hepatic artery
3. portal vein



Relations of 1st part duodenum……cont

post.

- The lesser sac (behind the stomach and lesser omentum)
  - gastroduodenal Artery (if there is a peptic ulcer on the posterior wall of the 1st inch perforation and infiltration may occur along with bleeding from this artery)
  - the Bile duct
  - portal vein
  - I.V.C



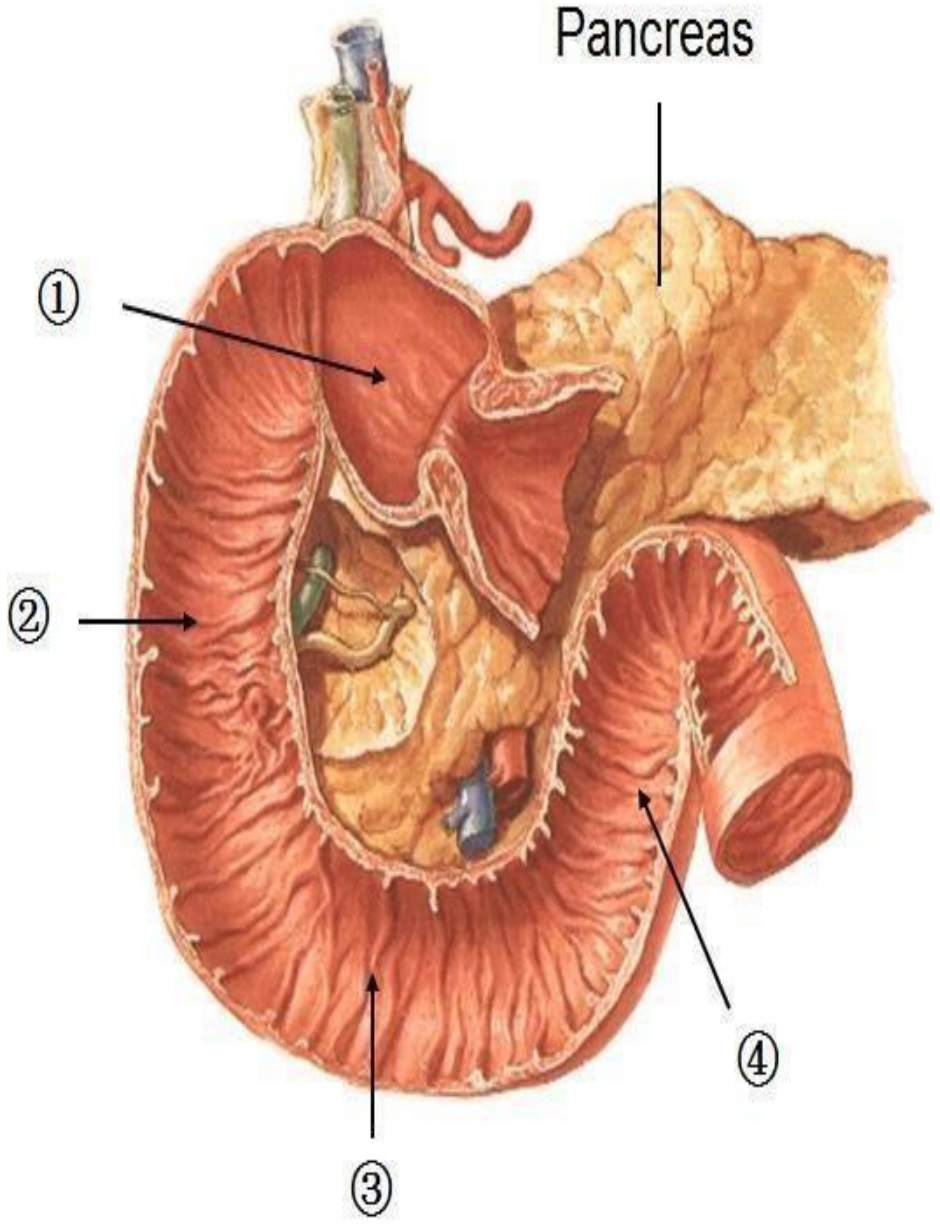
Inf.

- The head of the pancreas

2nd part of duodenum

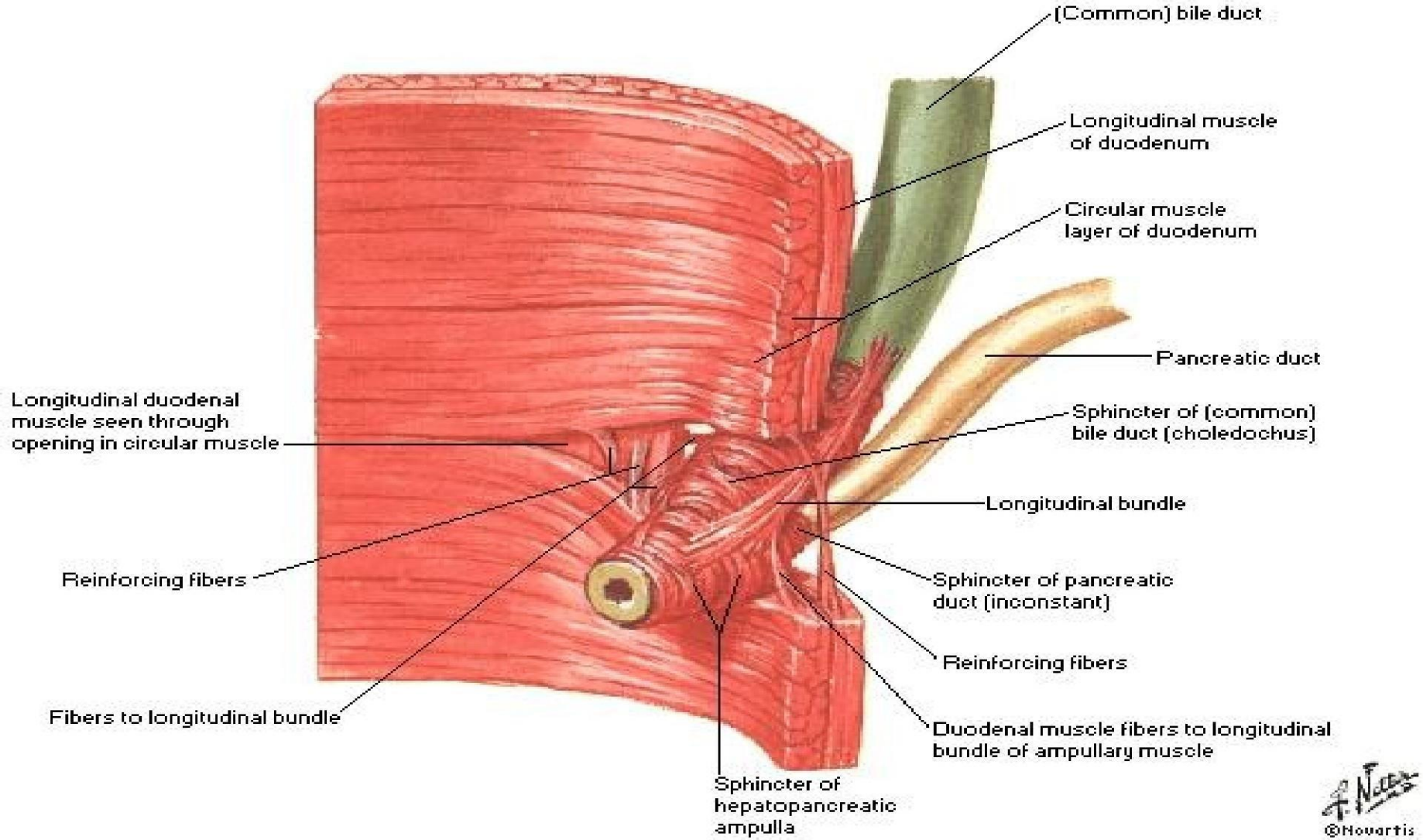
- It is 3” long
- runs downward vertically on the right side
- In front of the Rt.kidney & right ureter .
- It ends next to the 3rd and 4th lumbar vertebrae.
- halfway of it, The bile duct and the main pancreatic duct pierce the medial wall, and then form the **ampulla** that opens in the **major duodenal papilla**
- The accessory pancreatic duct (if present) opens in the **minor duodenal papilla** more superiorly.

- Importance of the 2nd part lies in that it receives the common bile and pancreatic ducts’ secretions.



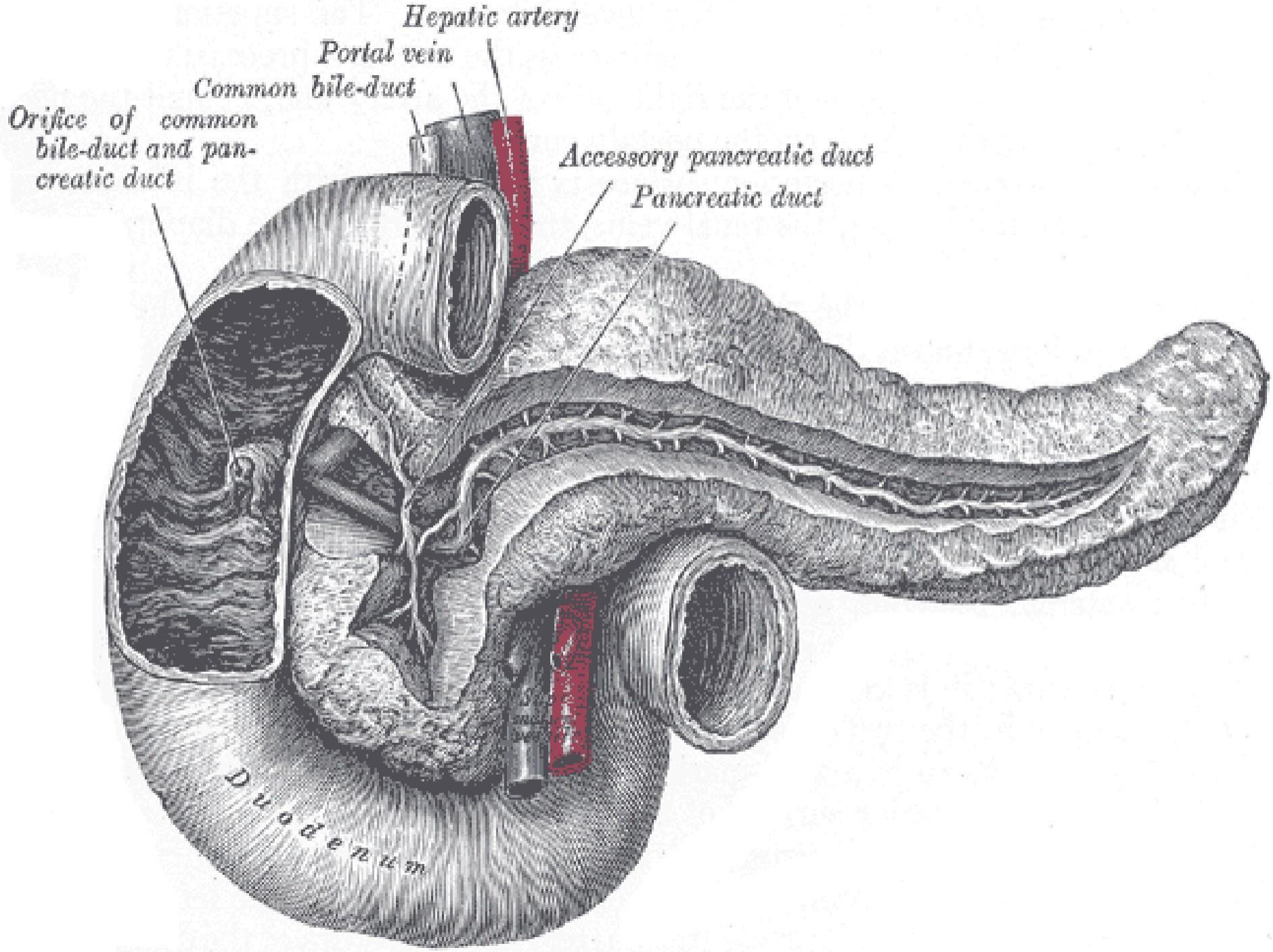
Junction of Bile Duct and Duodenum

Dissection



Note : anatomical sphincter means it's surrounded by circular smooth muscles .Absence of these circular smooth muscles means it's a physiological sphincter

Hepaticopancreatic ampulla (Ampullaof Vater)


Hepatic artery
Portal vein
Common bile-duct
Orifice of common bile-duct and pancreatic duct
Accessory pancreatic duct
Pancreatic duct
Duodenum

Relations of 2nd part of duodenum

Ant.

- The gallbladder(fundus)
- Right lobe of the liver
- Transverse colon
- coiled of small intestine.

Post.

- Hilum of Rt. Kidney
- Rt. Ureter.

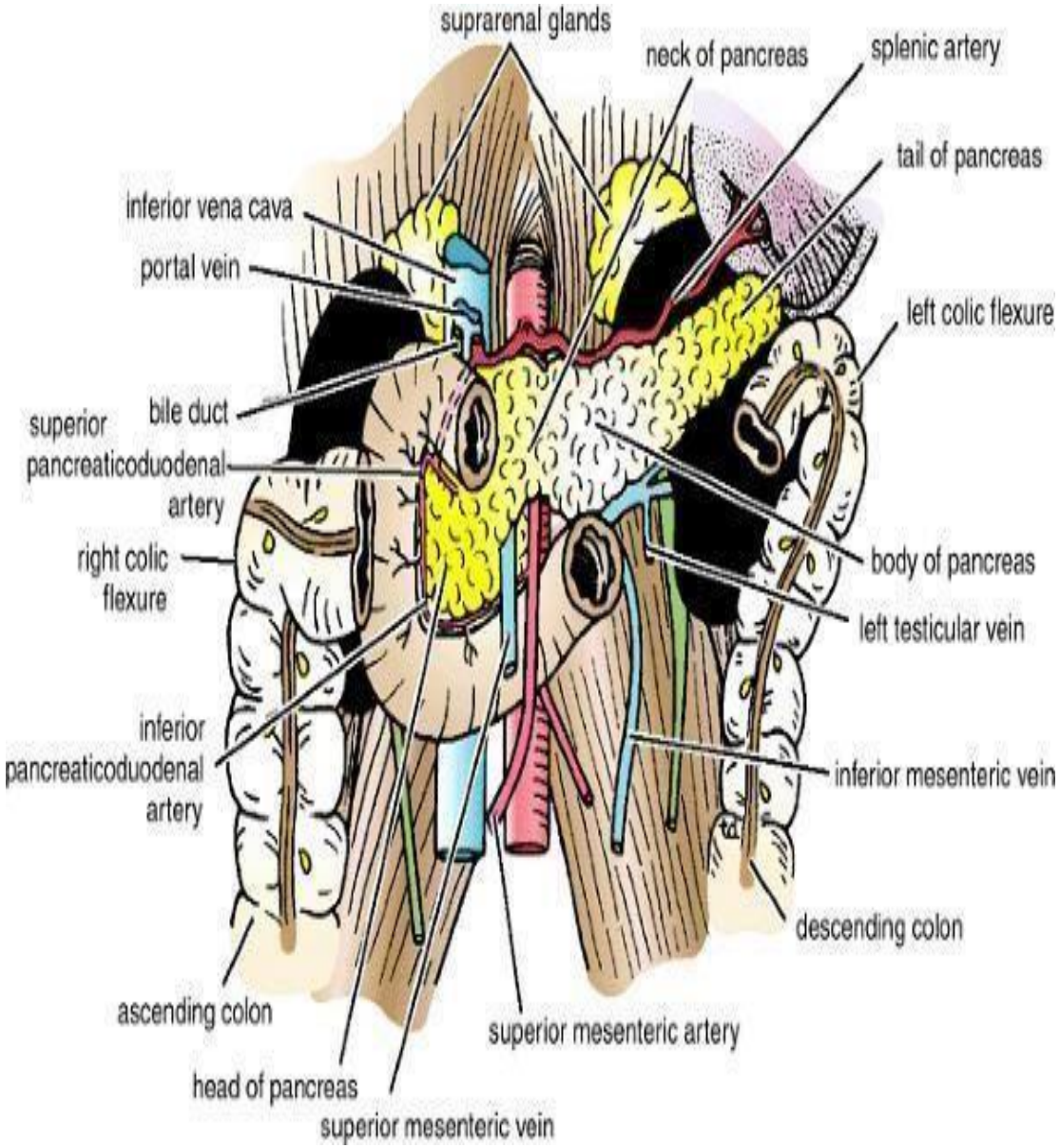
Lateral.

- Right colic flexure
- Ascending colon
- Right lobe of the liver.

Medial.

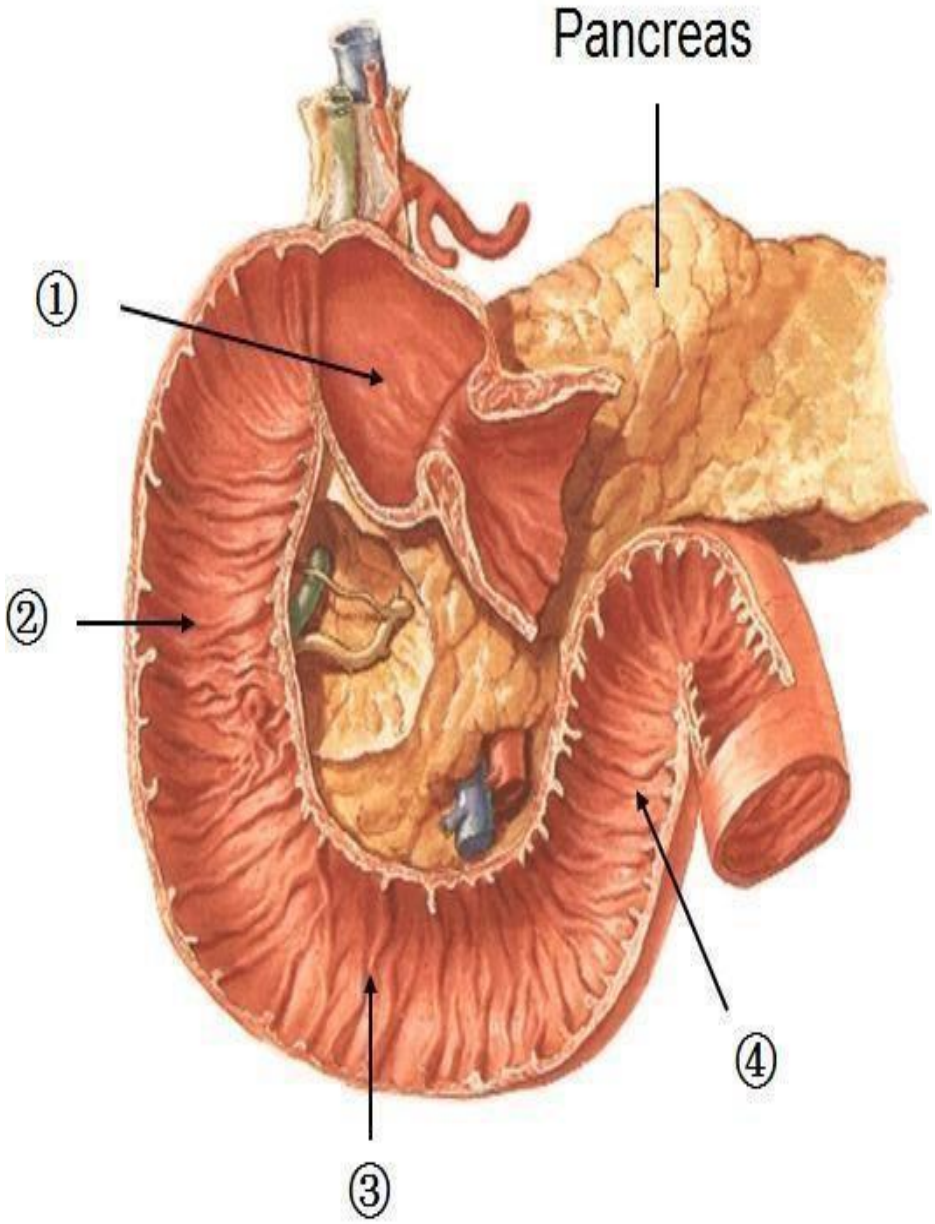
-Head of pancreas

-Bile and pancreatic ducts.



3rd part of duodenum

- 4” long Runs horizontally to the left
- Runs in front ofthe vertebral column
- On the subcostal plane.
- Under the lowermargin of the head of pancreas
- Above the coils ofthe jejunum.



Relations of 3rd part of duodenum

Anteriorly:

- The root of mesentery of the smallintestine
-the superior mesenteric vessels contained within the mesentery
- coils of jejunum

Posteriorly:

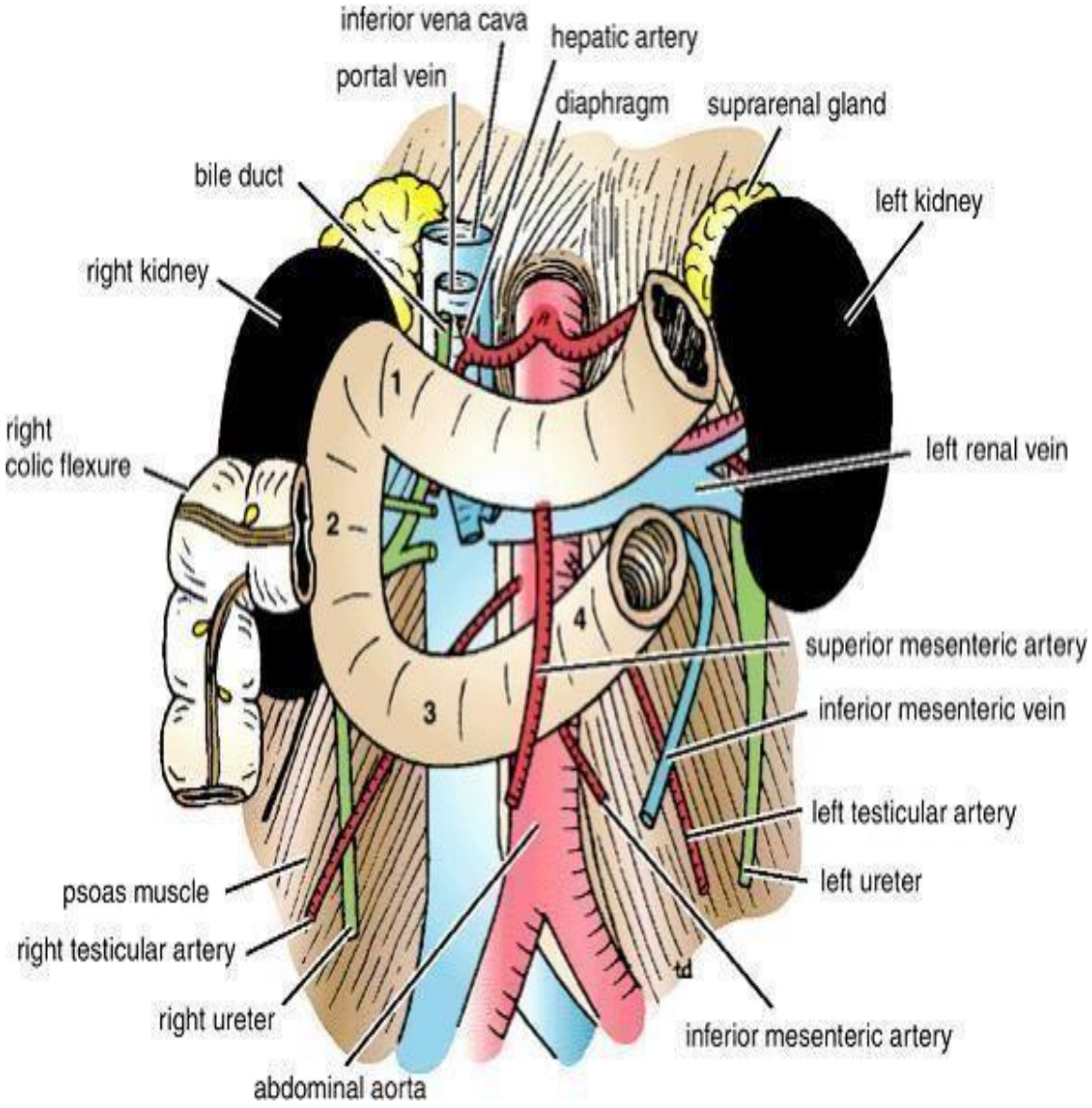
-The right ureter
-The right psoas muscle
-The inferior vena cava
-The aorta

Superiorly:

- The head of the pancreas

Inferiorly:

- Coils of jejunum



4th part of duodenum…..cont

- 1” long
- Runs upwardto the left
- End in the duodejejunal junction atthe level of the 2nd lumbar vertebrae 1” to theleft.
- The junction (flexure) is held in position by **the ligament ofTreitz**, which is attached to the right crus of the diaphragm (duodenal recess).

Relation of 4th

Ant.

- The beginning of the root of the mesentery
- coils of the jejunum.

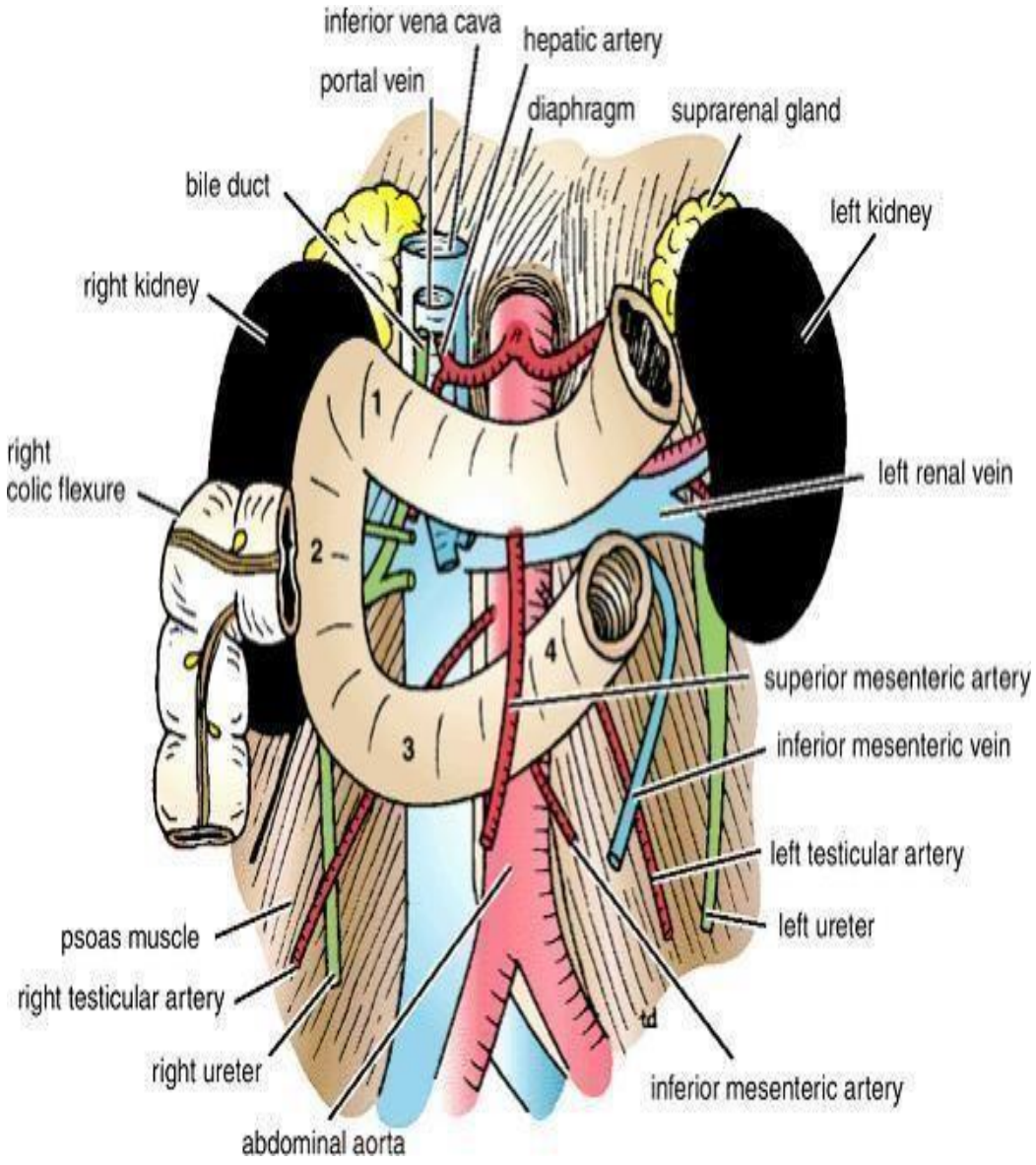
Post.

- Lt. psoas major

-the sympathetic chain on the left margin of the aorta.

Sup.

- Uncinate process of the pancreas.



You’re about to read a bit of embryology ,so bare with me

- The GI track is divided to three parts: 1. Foregut (oesophagus (lower part), stomach and upper half of duodenum).
- Blood supply of foregut → Celiac trunk of abdominal aorta 2. Midgut (from lower half of duodenum to lateral\distal third of transverse colon)
- Blood supply of midgut → Superior mesenteric artery 3. Hindgut (from distal third of transverse colon to rectum)
- Blood supply of hindgut → Inferior mesenteric artery

Blood supply of duodenum

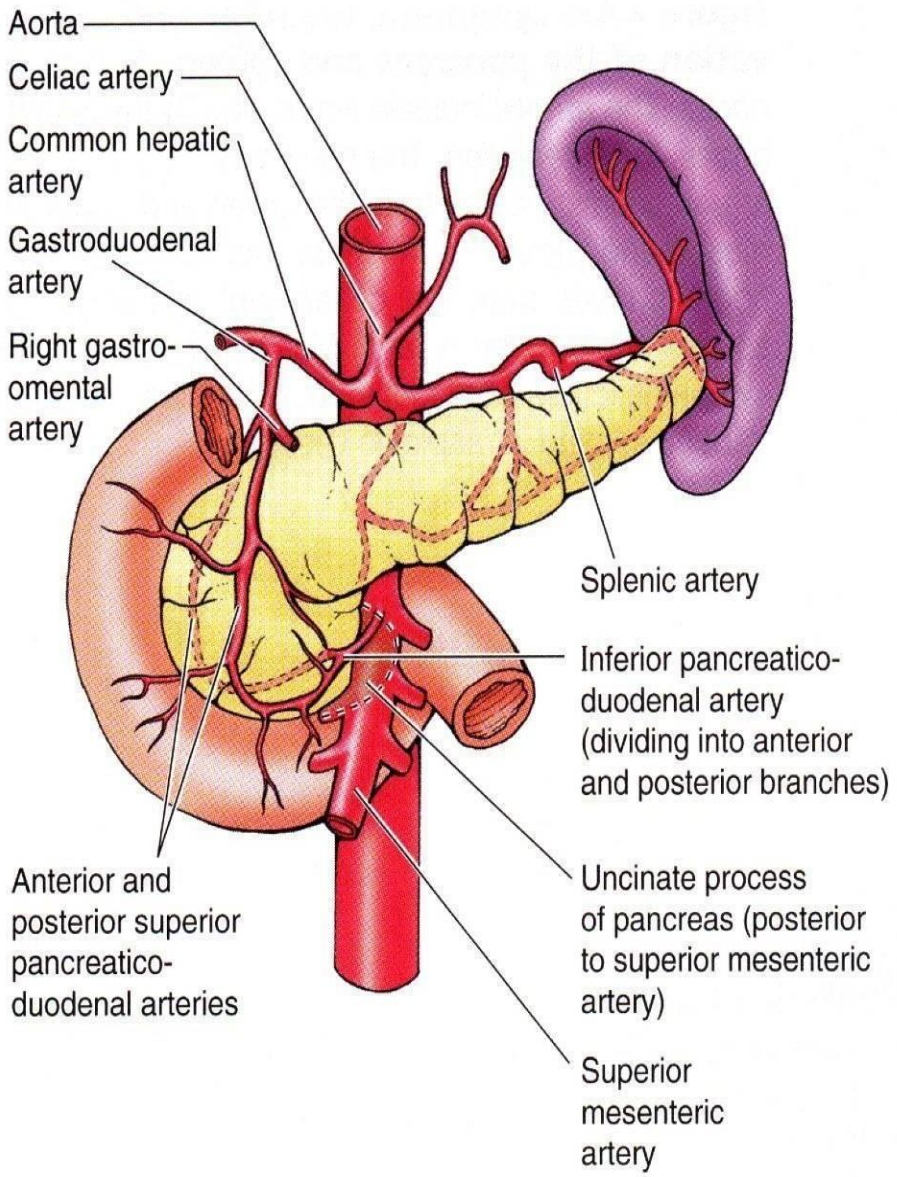
- **Arteries**

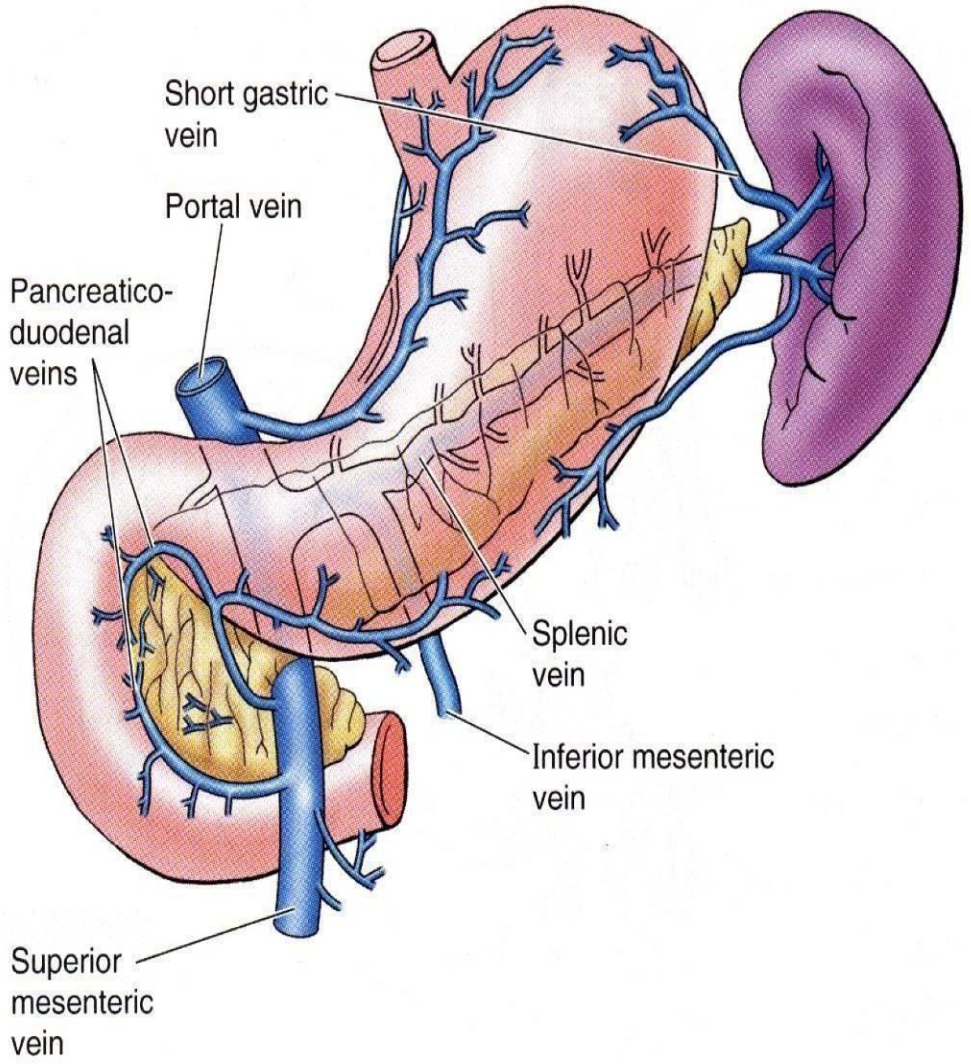
1 **upper half** **(1st part + upper1/2 of 2nd part)** , it follows the foregut and is supplied by the **superior pancreaticoduodenal artery**, a branch of the gastroduodenal artery (from celiac trunk)

2The lower half **(lower ½of 2nd part +3rd+4th part)** ,it follows the midgut and is supplied by the **inferior pancreaticoduodenal artery**, a branch of the superior mesenteric artery

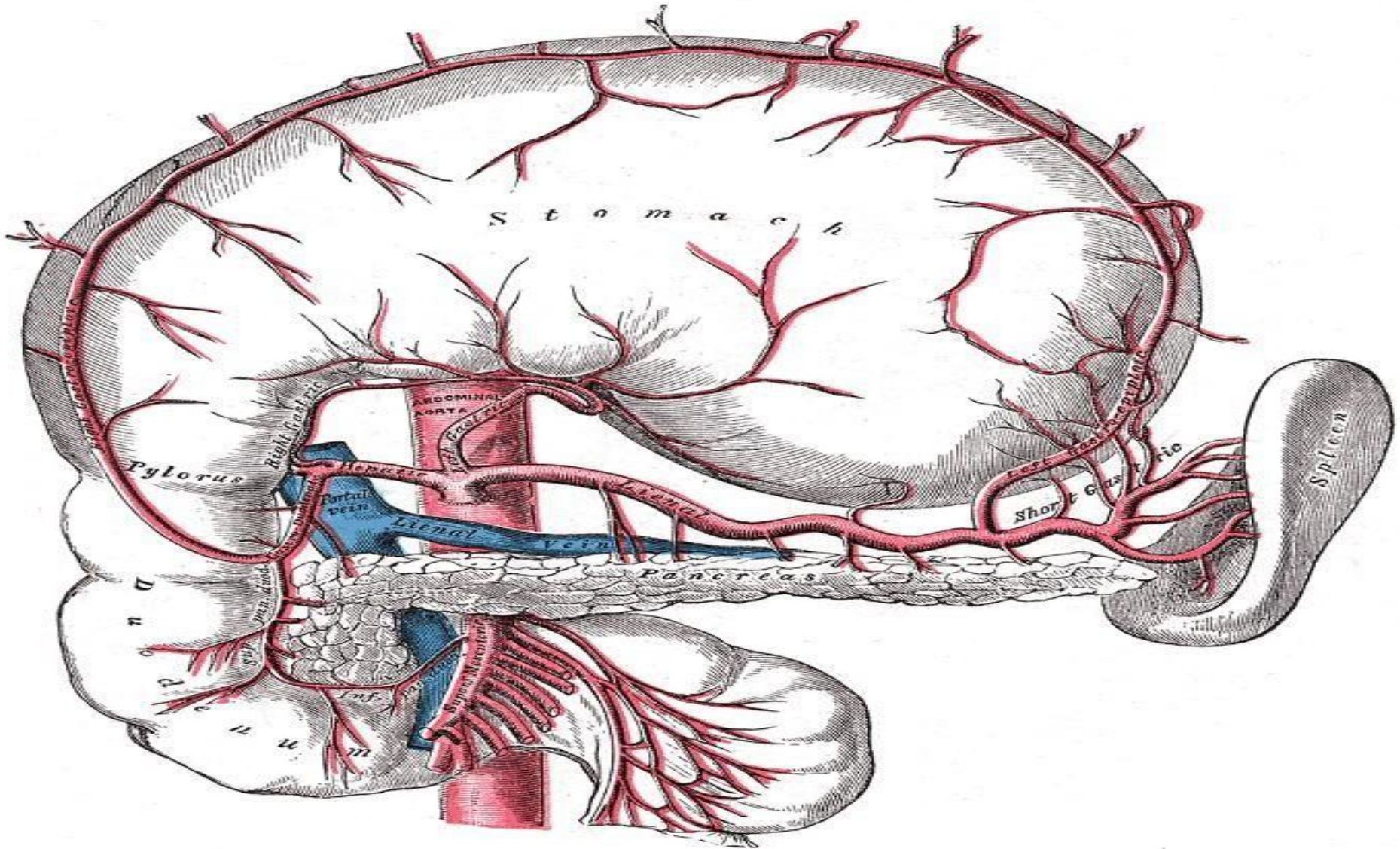
- The upper & lower halves are separated by the major duodenal papilla and sphincter of Oddi.

Arterial supply and venous drainage of theduodenum





Blood supply forduodenum

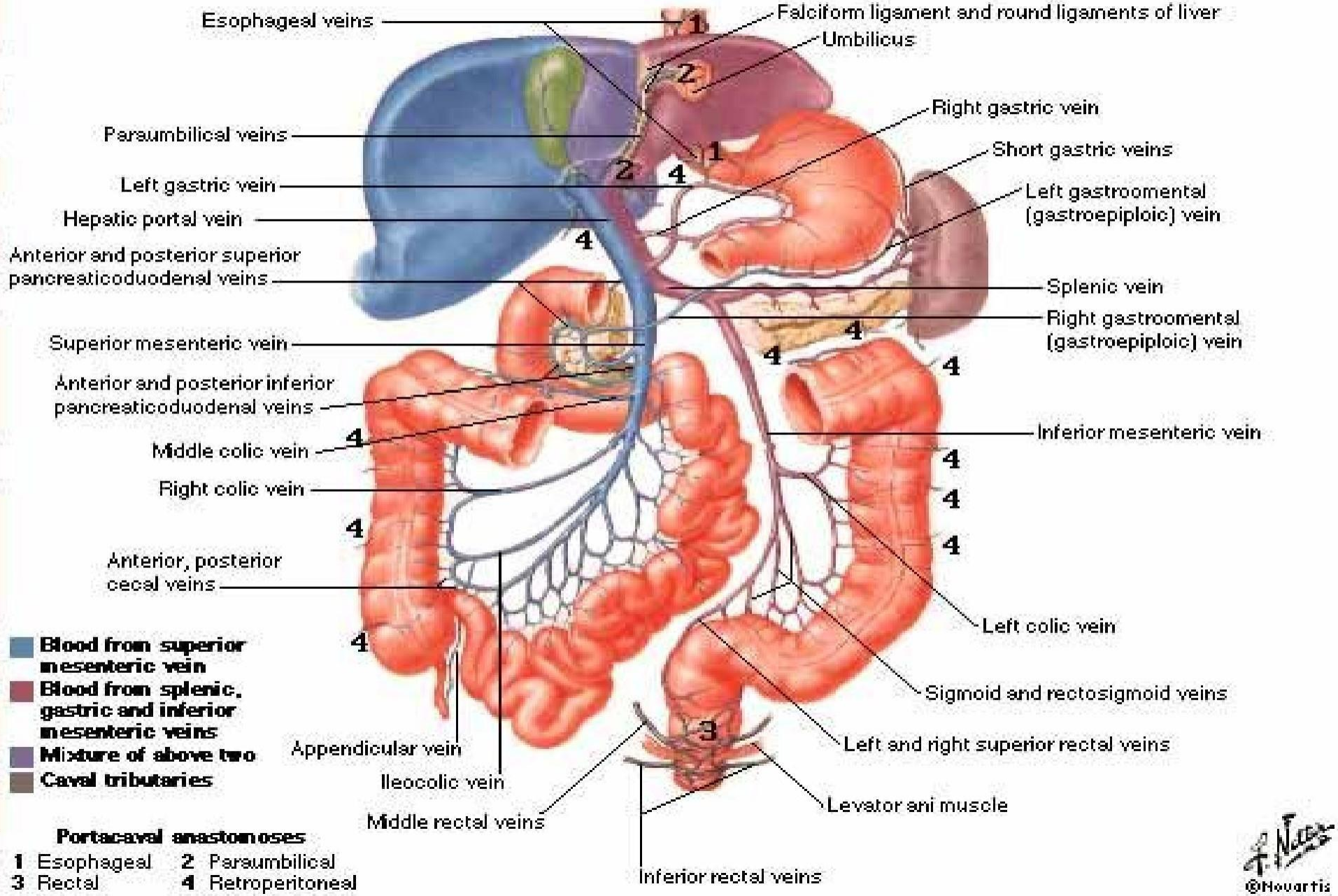


Veins of duodenum

- The superior pancreaticoduodenal vein drains into the portal vein
- The inferior vein joins the superior mesenteric vein .

Hepatic Portal Vein Tributaries

Portocaval Anastomoses



Lymphatic drainage

- The lymph vessels followthe arteries
- **drainage upward →** via pancreaticoduodenal nodes →
- the gastroduodenal nodes → the celiac nodes .
- **drainage downward →** via pancreaticoduodenal nodes → the superior mesenteric nodes around the origin of the superior mesenteric artery.

Nerve supply

- Sympathetic nerve
- parasympathetic nerves from:
  1. The celiac plexus
  2. Superior mesentericplexus.